

Railway Age Gazette

PUBLISHED EVERY FRIDAY AND DAILY EIGHT TIMES IN JUNE BY THE
SIMMONS-BOARDMAN PUBLISHING COMPANY
WOOLWORTH BUILDING, NEW YORK.

CHICAGO: Transportation Bldg. CLEVELAND: Citizens' Bldg.
LONDON: Queen Anne's Chambers, Westminster.

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Subscriptions, including 52 regular weekly issues and special daily editions published from time to time in New York, or in places other than New York, payable in advance and postage free:

| | |
|---|---------------|
| United States and Mexico..... | \$5.00 |
| Canada | 6.00 |
| Foreign Countries (excepting daily editions)..... | 8.00 |
| Single Copies..... | 15 cents each |

Engineering and Maintenance of Way Edition and four Maintenance of Way Convention daily issues, North America, \$1; foreign, \$2.

Entered at the Post Office at New York, N. Y., as mail matter of the second class.

WE GUARANTEE that of this issue 8,750 copies were printed; that of these 8,750 copies 7,366 were mailed to regular paid subscribers to the weekly edition, 250 were provided for counter and news companies' sales, 1,070 were mailed to advertisers, exchanges and correspondents, and 124 were provided for samples and office use; that the total copies printed this year to date were 166,350, an average of 9,242 copies a week.

The RAILWAY AGE GAZETTE and all other Simmons-Boardman publications are members of the Audit Bureau of Circulations.

VOLUME 58

APRIL 30, 1915

NUMBER 18

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GENERAL NEWS SECTION.....

*Illustrated.

The vote of 135 to 68 in the Pennsylvania House in favor of the repeal of the state extra crew law is as significant in its way as

Pennsylvania Extra Crew Legislation

was the overwhelming referendum vote of the people of Missouri for the repeal of similar legislation. It is one among many indications that public sentiment is running very strongly against legislation imposing unnecessary restrictions and expenses on railways. The change in public sentiment regarding regulation of railways which has occurred within the last two years is so great as to be almost astonishing. The train crew law in Missouri was killed by publicity. The railways told the facts and the people did the rest. The vote in the Pennsylvania House also was a result of pub-

licity. The railways told the facts and the law-makers and public responded in the only way that rational people could. The great change in public sentiment which the votes in Missouri and in the Pennsylvania House reflect has itself been effected by publicity. The leaders of the railways decided some years ago that as publicity had proved such an effective means for destroying abuses in the railway business, it probably would be an equally effective means for stopping unjust attacks on the roads and protecting them in their rights. This view is being fully justified. The campaigns of publicity which the railways have conducted have both secured the repeal of a little bad legislation and have prevented the enactment of a lot of it. The more the facts about both railway management and railway regulation are dragged out and exposed to the sunlight the less bad management and the less bad regulation there will be. The railways know that abuses in management have not been able to stand publicity and if they keep on using it they will find that crooked regulators and crooked regulation are just as incapable of standing it.

The earnings of the steam railways of the United States for the fiscal year ended June 30, 1914, resulted in a total operating

Pulverized

Fuel for

Locomotives

revenue of over \$3,000,000,000, only about \$217,000,000 of which was paid out in dividends, while over \$250,000,000 was paid for locomotive fuel, this item representing about 25 per cent of the total cost of conducting transportation.

Moreover, the cost of fuel for locomotives is increasing each year to such an extent that almost every important railway is taking active steps to educate its employees along the lines of fuel economy. Much has been accomplished by means of improved appliances on locomotives in obtaining a greater percentage of useful work from each pound of coal burned, but the burning of coal on grates has been continued because no one has seemed able to perfect a better method. It has long been recognized that the ideal method of burning coal, and the one which produces practically perfect combustion, is that of burning it in suspension in a pulverized form. A solid cubic inch of coal exposes only six square inches for the liberation of heat, while in powdered form, a cubic inch of coal exposes from 20 sq. ft. to 25 sq. ft., making possible a much more uniform production of gas. Until recently no experimental work has resulted in a practical application of this method to the production of steam, but experiments conducted during the past year have proved highly successful in using pulverized coal in locomotive fireboxes under difficult operating conditions. An outline of this work and its results will be found elsewhere in this issue. The possibilities of making use, in pulverized form, of the low grade coals in the West which now have to be passed over as unsatisfactory for locomotive use, will be readily recognized, as well as those of using dust, screenings, slack and culm which accumulate from all mining operations. The successful use of pulverized fuel in locomotive fireboxes should open the way for a marked reduction in expenditures for fuel on railways.

The Interstate Commerce Commission in the industrial railways case and again in the five per cent case indicated to the railways

Difficulties in Charging for "Free Services"

that it believed they were rendering at terminals many free services which, because they were free, worked unfair discriminations in favor of those who received them. It said that the railways

should make reasonable charges for these services both to remove the discriminations and to secure needed increases in their net earnings. In an attempt to conform to the views of the commission the eastern railways filed tariffs fixing rates for the spotting of cars, and both eastern and western railways filed tariffs imposing charges for trap car service and other similar services for which previously they had not been charging. The shippers naturally attacked these tariffs. Hearings regarding

them have been going on before the commission ever since. It is now evident that the case of the railways for the specific tariffs which they filed fixing rates for spotting cars has broken down, and it looks as if their case involving charges for trap car service is going the same way. It has been admitted by the counsel for the eastern lines that the spotting tariffs on file with the commission are discriminatory, and, as a practical matter, unworkable. The hearings have failed to establish or even indicate any fundamental principle which will serve as a guide in determining where special terminal charges should be made or the amounts that should be charged. This is chiefly due to the enormous multiplicity and diversity of the conditions which have been shown to exist at different centers of industry. The varied conditions which exist are the product of years of development of both commercial industries and the transportation industry, and, although a continuance of the practices which have grown up around these conditions may result in some unfair discrimination, it has become only too evident that any attempt to revolutionize the conditions and practices in pursuance of a desire to establish theoretical equity will do far more harm than good. As George Stuart Patterson, of the Pennsylvania Railroad, has suggested, the subject is one which could be more satisfactorily handled by means of informal conferences between the commission and representatives of the railways and the shippers than it can be by means of formal hearings and orders. It seems clear that in any formal order the commission makes it should confine itself to removing palpable discriminations and that any other action it takes should be directed to bringing about conferences between all directly concerned for the purpose of establishing correct fundamental principles around which conditions and practices may develop in future.

PUBLIC REGULATION OF RAILWAY WAGES

THE able paper on public regulation of railway wages which Professor Frank Haigh Dixon of Dartmouth College presented at the last meeting of the American Economic Association points out clearly and forcibly the defects in our present system of dealing with labor controversies on railways. A part of Professor Dixon's paper is published elsewhere in this issue. The three prime shortcomings of our present system indicated by Professor Dixon are, first, that it does not prohibit strikes in advance of investigation of the merits of controversies; second, that it does not provide that investigations or arbitrations shall be conducted by experts; third, that it does not make it necessary for advances in wages resulting from arbitration awards to be considered in the regulation of railway rates.

The remedy for the first of these shortcomings is to reverse the provisions of the Newlands act. Under this law postponement of lockouts and strikes until after investigation of the merits of controversies is entirely voluntary, while obedience to the awards of arbitration boards is compulsory. The law ought to be so changed as to prohibit lockouts or strikes until after investigations of the questions involved by impartial public authorities, and, arbitration having thus, in effect, been made compulsory, obedience to the awards should be made voluntary. The public has a right to insist that there shall be no interruption of railway service until competent representatives of the public have investigated and made public their findings regarding the points in dispute.

In order that investigations or arbitrations may be conducted by impartial experts rather than, as now, by boards composed partly of experts who are partisans and partly by non-partisans who are not experts, there is need, as Professor Dixon indicates, for the appointment by the government of investigators or arbitrators whose tenure of office shall be as permanent as that of members of the Interstate Commerce Commission or of the Interstate Trade Commission. Only by having permanent public officials assigned to this duty will we establish a system of settling wage disputes which will be consistent and just as between the parties directly concerned and which will adequately protect the rights and interests of the public.

Perhaps the best way to establish a direct and equitable relationship between the regulation of rates and the regulation of wages would be to give the latter function to the Interstate Commerce Commission. It is understood that the commission is not anxious to get the job, and this is not at all surprising. But every dollar of railway wages must be paid out of railway rates, and since wages take 45 cents out of every dollar earned it is evident that if changes in wages are not to be fully and frankly recognized in the regulation of rates, the effects on railway net earnings will be very unhappy.

One of the most important wage arbitrations ever conducted, that between the western railways and their engineers and firemen, has just been concluded at Chicago, and the arbitrators are now considering their award. Regardless of what the award may be, it is likely to give an impetus to the discussion of the regulation of railway wages. To those who wish to inform themselves, regarding this important subject Professor Dixon's clear and authoritative paper will be very valuable.

THE NOISE NUISANCE

A PROMINENT eastern railroad, one which has an energetic press agent, recently announced that employees had been notified that the company wished their co-operation in avoiding complaints of noises around sleeping cars at night. Rather mild language. Another superintendent, one on an important western road, suggested, unconsciously, one reason why mild language is so generally used in dealing with the noise nuisance, when he said that, "We must be careful and not positively prohibit the use of the bell or the whistle, as these signals are sometimes absolutely necessary, and the failure to use them may tangle us up in court controversies."

These incidents indicate the difficult nature of this problem. It is difficult because it is not of first importance. Where the noise nuisance is of first importance the question is simple. On the New York Central, for example, between Woodlawn and the Grand Central Terminal, New York City, about 12 miles, four-track, through a thickly settled district, trains pass every few minutes all day; but never a whistle is heard, and very little is heard of the bells. The rule is absolute; no use to be made of these noise-makers except in case of positive imminent danger to life or limb. But on any road, as soon as the engine-man is allowed some discretion, trouble begins. The superintendent tries rigid orders, and the plan does not work. He tries keeping silent (himself) and complaints begin to come in. Enginemen prove to have all kinds of defects of judgment; and innumerable investigations produce only partial improvement; and, not deeming the problem a vital one, the superintendent at last gets tired and contents himself with mild language, like that quoted above.

But why should enginemen's deficiencies of judgment be taken for granted? They must be educated, if any progress is to be made, and the only way to educate is by the time-honored but slow processes of all education; deal with individuals, drive each point home before distracting the learner with another, and enforce "review lessons" as many times as may be necessary. We speak of enginemen more particularly, because the whistle, the bell and the pop-valve are the most prominent nuisances; but the procedure is the same, in principle, with all classes of employees.

Is it a common thought that we are doing pretty well already; that further progress would cost more than it would be worth? Surely not, if we reflect for a moment, even superficially. In various other matters, no more important than this, we are not satisfied with a percentage of 99.75; we strive for 100. Why not here? It is true that being awakened in a sleeping car by an outrageous noise at 2 a. m. is not the worst misfortune in the world. One can go to sleep again and wake up at daylight with the spirit of forgiveness toward both the man who made the noise and the employer who tolerates him. But the way to make friends of passengers is to run things so that forgiveness will not have to be exercised very often. Again, a campaign

to secure 100 per cent in repression of unnecessary noise helps powerfully to secure perfection in other things where carefulness is required in small matters. Ticket sellers say that they make fewer mistakes when business is brisk than when passengers come to the window five minutes apart. On the same principle an engineman keeps his mind more alert if he is required to watch out in several different directions simultaneously.

This comment was started by the suggestion that some of our educational methods do not seem to produce wholly satisfactory results. Except in favorable circumstances, circulars and reasoning and suspensions and reprimands all leave much to be desired. In this situation, the most practicable suggestion that we have heard is to replace arguments with facts. The arguments are all well known. They need strengthening, but apparently can be made stronger only by being backed up by more facts.

Why not have printed a full and carefully written record of all noise offenses that have occurred on your division for several months past? Go far enough back to make a long list; then have these facts impressed on the men's memories. The superintendent who feared to prohibit too positively, lest his employees should sound the whistle too little, practically admitted that he could not trust his men's judgment. One way to improve judgment—the present methods having proved unsatisfactory—will be to compel the men to do a lot of thinking on the subject. With enough records—vivid, forcefully expressed records—this can be done.

Aside from enginemen the class most needing attention is the workmen around large stations at night—including express company employees. In most stations, the percentage of good service in this respect already is high. In a large railway station the suppression of all noises is at times impossible. In attempting to give sleeping-car passengers complete quiet we are taking a large contract. But, as already suggested, to strive for perfection in this matter will improve the service in other directions; so the striving is well worth while.

DEVON AND ILFORD

A PROMINENT railway officer remarked recently, in discussing the automatic train-stop problem, that it is a "live question." As a good many things seem to indicate that among the great majority of railroad officers this question is in a somewhat somnolent condition, the remark quoted is of special interest. One reason why in some quarters the question is still a live one is to be found in reports of train accidents like those in Connecticut and in England, given in another column of this issue. Disastrous train accidents have been comparatively infrequent in this country for many months now, and a short-sighted optimist might conclude that to drop the strenuous discussions of former collision days would be entirely justifiable. But any one disposed to take this view should remember two things—that when business is dull the disasters diminish in even larger proportion than does the volume of traffic (indicating an increase later); and, secondly, that however infrequent the spectacular smash-ups which excite the public, the wideawake railroad officer is never deceived, even in the dullest times. To the superintendent who lays his plans for safety, not according to newspaper clamor or the published interviews of congressmen or commissioners, but according to the known errors of locomotive runners (errors which do not become public) the question of securing perfect observance of signals is always a live one; and if the superintendent is a live one, and is on an important and busy road, he finds that this question cannot be separated from the automatic-stop question; automatic stops have already got a respectable standing.

In short, the principal question at issue, both at Devon and Ilford, is the hackneyed one of whether enginemen can be educated to 100 per cent efficiency as lookout men; or, more in detail, whether runners, with the aid of another man on the engine, instructed to act as monitor, can observe all signals with such unerring regularity as to make automatic train-stopping devices unnecessary. And, as a part of this main question, we have a second one, which bothers the great majority of railroad officers,

namely, can the men in charge of the maintenance of signals be depended on to keep automatic devices in such perfect condition that they will prove really desirable as an additional safeguard, over and above the minds of the best-trained force of enginemen? In this connection, the term "best-trained" means, of course, the best that may be expected to be found in actual service; not the best that can be theoretically planned for.

We have called these two accidents notable. Devon is notable because the officers of the New Haven road have given very careful attention to the training of enginemen for two years and more. An investigator would be warranted in expecting to find there the best attainable conditions; good men, well trained, with adequate inspection. In view of the excellent records of the principal English lines, Americans expect to find these good conditions prevailing in England at all times. If mistakes occur on these roads, still more may they be expected on the "average" road. On both the New Haven and the Great Eastern we find the system of visual signals faultless; and on both of them the requirement that firemen shall aid in keeping a lookout proved to be worthless, or worse.

This editorial is not written for the purpose of going over the old arguments; the reader who wants those can refer to our files of last summer. The question today is, Is this a live problem? If it is, why does everything move so slowly? The American Railway Association committee seems content to drop automatic stops; to pin its faith on improvement in discipline. Assuming that the art of discipline is so well understood that co-operative study or investigation is unnecessary, the position of the committee, having been accepted by the association, absolves the association from the duty of further action. But suppose the committee is wrong; suppose that some automatic device ought to be thoroughly tried; suppose that the whole question ought to be tried out, to a conclusion, for the general good; is our officer, quoted at the beginning, doing his full duty? The New Haven, the New York Central, the Central of New Jersey, the Erie, the Lackawanna, the Pennsylvania, the Burlington, the Chicago & Eastern Illinois, the Maryland & Pennsylvania, and we don't know how many other roads, are encouraging outside experimenters; but where are the signs of progress? What active interest are the roads themselves taking? The Chicago & Eastern Illinois has the most business-like program; but it has been criticized. And, criticism or no criticism, the apparent indifference of the principal roads to this apparently useful experiment suggests that, as regards the American railroad profession as a whole, the automatic stop question, though perhaps alive, is in great need of clarification.

It is possible, perhaps, to clarify a little by a study of Lieutenant Colonel Von Donop's report; though his conclusion is characterized by the time-honored English mildness and indirection. He shows up the mistake of the Great Eastern in putting audible warnings at home signals—which in most cases is an almost useless expenditure of money—but speaks of the correction of this mistake as merely "desirable," not of pressing importance. The Board-of-Trade inspectors as a body have long since declared unequivocally for automatic stops or cab signals, but the writer of the present report seems to have forgotten that declaration. Again, he asks for an "unmistakable" warning at the distant signal; but that is hardly a correct statement of the point. Runners do not mistake so much as they ignore. "Inescapable" would be a better word. Perhaps the most instructive thing in this British report, for us, is the calm ignoring of the automatic-stop question; if the Englishmen are sound in their position, our live question should be, not discipline vs. automatic stops, but, rather, discipline vs. automatic stops or audible distant warnings.

The questions here suggested may be summed up about like this: Do we want some mechanical or electrical appliance to supplement the best engineman's vigilance? Does this want exist continuously, or only when the public is excited by a disaster? If the need is just as great now as it was in 1913, should not the problem be settled in months instead of being allowed to drag through years?

Letters to the Editor

THE YARDMASTERS' CONVENTION

SEATTLE, Wash., April 17, 1915.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

The second annual convention of the United Yardmasters' Association will be held at Seattle, Wash., from June 15-19, next. We would like to have men from the mechanical, claims and transportation departments of different railroads attend this meeting to point out to us the deficiencies in our work so that we can consider means to remove them.

Other railway organizations such as the Car Service Association, the Master Mechanics' Association, the American Railway Engineering Association, etc., hold meetings and exchange ideas. The mechanical men discuss broken drawbars and damaged car sills, the claim agents talk about the losses to their companies resulting from rough handling of cars, etc. These meetings are excellent and do much good, but they remind one of a temperance lecture telling a Y. M. C. A. audience of the terrible effects of liquor when it was evident that no one listening to the speaker ever took a drink. To a certain extent these associations are doing what the temperance lecturer is doing. Few of them have ever told a switchman that he was doing wrong when he was careless and damaged the car and contents. It has remained for the yardmaster to talk to the engineer and switchman about carelessness. The same applies to the per diem question. The average switchman knows nothing about per diem and cares less. With proper training the roads can save much money without any additional expense. This can best be done by securing the intelligent co-operation of the yard forces.

Representatives from the mechanical and claim departments can do much good by attending this convention and discussing these problems with the members.

JOHN FLAHERTY,

General Yardmaster, Northern Pacific.

INTERSTATE COMMERCE COMMISSION STATISTICS

NASHVILLE, TENN.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

Beginning with statistics for the year 1911, the Interstate Commerce Commission abandoned the ten territorial groups and substituted three districts, "substantially identical with the three great classification territories," and subdividing the roads into three classes, according to the magnitude of their operations. No one will question the wisdom of this change; but the southern and southeastern roads have good reason to believe that the results shown for "Roads in Class 1, Southern district," do not fairly reflect the conditions surrounding the average or typical southern road, particularly when compared with the results shown for "Class 1, Eastern district."

It is stated in the commission's report that "Each operating carrier is assigned to that district in which the major part of its operations lies, or *with which it seems most closely allied in character*" (italics my own). But there are those who will object to the inclusion of the Norfolk & Western, Chesapeake & Ohio, and Kanawah & Michigan, in the Southern district, on account of their being more analogous to the Trunk lines with regard to traffic density, rate structure, and geographical location, notwithstanding the greater portion of their mileage may be located south of Mason and Dixon's line.

The dividing line between official and southern classification territories is not so clearly defined as to admit of an absolute segregation of roads. However, it is well known that rates between Richmond, Norfolk, and Portsmouth, on the one hand, and points in CFA territory are made by the use of percentages of the New York-Chicago rate, and subject to the official classification. Moreover, this system of rate making applies to and

from all of the Ohio river crossings, and is projected into southern territory to Nashville, Tenn., and Memphis. As rates to southern territory are constructed on the river crossings, or Virginia cities combination, there can be but a small proportion of competitive traffic handled by the Chesapeake & Ohio or Norfolk & Western on rates that are not made on the Trunk lines basis and subject to the official classification.

Comparing the gross and net operating revenues, we find the following reported for the year 1912:

| | Gross Operating Revenue. | Net Operating Revenue. |
|----------------------------------|--------------------------|------------------------|
| Eastern district, class 1..... | \$21,166 | \$6,294 |
| Norfolk & Western..... | 19,766 | 6,997 |
| Chesapeake & Ohio..... | 15,152 | 5,150 |
| Kanawah & Michigan..... | 17,860 | 6,426 |
| Southern district, class 1..... | 10,235 | 2,962 |
| *Southern district, class 1..... | 9,376 | 2,591 |

Eliminating the Norfolk & Western, Chesapeake & Ohio and Kanawah & Michigan.

The effect of including these lines in the Southern district is most striking when a comparison of the freight density and average receipts per ton, per mile, is made.

It will be helpful in making such a comparison to also consider the former grouping. The present Eastern district comprises old Groups I, II, III, and a part of VI, while the present Southern district comprises old groups IV and V. Group I included the New England states; Group IV, the Virginias and Carolinas; Group V, the rest of the Southern states.

| Group or District. | Year. | Tons one mile per mile of road. | Average Receipts per ton, per mile cents. |
|--------------------------|-------|---------------------------------|---|
| I | 1910 | 873,877 | 1.115 |
| II | 1910 | 2,797,011 | .641 |
| III | 1910 | 2,020,779 | .588 |
| VI | 1910 | 906,835 | .751 |
| Eastern, all roads..... | 1912 | 2,131,165 | .647 |
| Southern, class 1..... | 1912 | 2,326,286 | .638 |
| Norfolk & Western..... | 1912 | 3,994,718 | .424 |
| Chesapeake & Ohio..... | 1912 | 2,957,056 | .407 |
| Kanawah & Michigan..... | 1912 | 3,845,189 | .404 |
| IV | 1910 | 1,098,029 | .655 |
| V | 1910 | 715,992 | .802 |
| Southern, all roads..... | 1912 | 952,994 | .700 |
| Southern, class 1..... | 1912 | 1,058,531 | .684 |
| †Southern, class 1..... | 1912 | 767,697 | .831 |

*Included in Southern district averages.

†Omitting the Norfolk & Western, Chesapeake & Ohio, and Kanawah & Michigan.

It is at once apparent that the inclusion of these three roads in the Southern district distorts the averages to the extent that they mean little, if anything. It will be noted that although the freight density of the Eastern roads (class 1) was more than twice as great as that of the Southern roads, the average receipts per ton per mile were only 0.46 mills less. Out of 35 roads in class 1, Southern district, only nine had average receipts less than .684, and only 13 had a density of 1,000,000 tons or more. Included in these are the three roads mentioned. These roads, though comprising less than 11 per cent of the mileage, handled more than 35 per cent of the tonnage.

It is true that no grouping can, in the very nature of things, be exact, but a grouping which covers so wide a field as to reduce the results to an average far removed from the actual conditions surrounding the majority of roads included, is, to say the least, not very illuminating.

While on the subject of statistics, I have been wondering why no one has suggested that perhaps the four elaborate tables, published annually by the commission, showing the number, classification and percentages of rolling stock, etc., equipped with air brakes and automatic couplers, have outlived their days of usefulness. Less than one per cent of the total number of engines and cars is not now so equipped, and it is just possible that the percentages will not change much in the next few years. The energy expended in preparing these tables might be conserved to a more beneficial use. For example, I imagine that railway executives, bankers, and others would be glad to have the commission publish tabulated statements, showing by years the amount and character of railway bonds maturing. Such a statement could well include a few recent years, as well as the years to come, with data showing the amounts paid, extended, defaulted, etc. I believe such figures would be of more general interest and value than air brake and coupler statistics.

J. L. HOPKINS.

The Success of Main Line Electrification*

A Discussion of Conditions Which Affect It, with Operating Data Dealing with Results on the New Haven

By W. S. MURRAY

Consulting Engineer, New York, New Haven & Hartford, New Haven, Conn.

The part of the New Haven system that has been electrified constitutes its most important division, extending from New Haven to New York, and on its main line, yards, sidings, and spurs every class of railroad movement is being daily made by electricity. The route mileage electrified is 73 miles, of which 61 is of four tracks and 12 of six tracks, thus giving a total main line mileage, measured in single track, of 316. To this may be added 184 miles of yards, sidings, and spurs, thus making a grand total, measured upon a single-track basis, of 500 miles. It is of

trick locomotives, and 69 multiple-unit cars. One main electrical shop has been completed, the capacity of which permits the maintenance and repairs of the above-mentioned electric motive power.

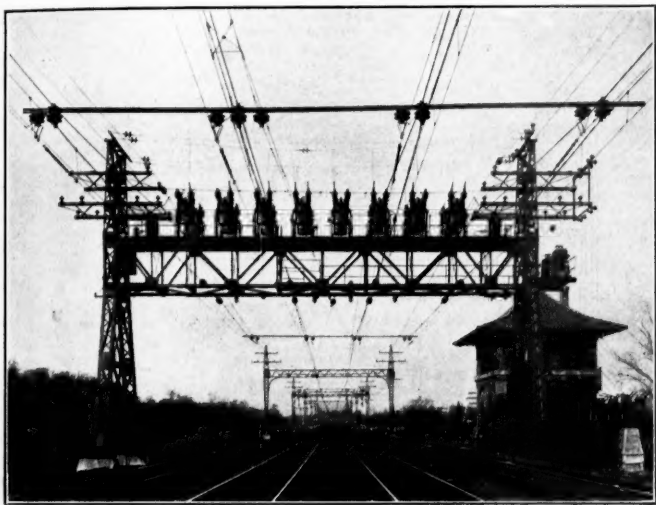
To date over \$15,000,000 has been expended on this electrical transportation plant. While such a figure represents the cash outlay, there have accrued to its appropriation accounts, during the process of construction, large credits for steam equipment replaced, as, for example, the 150 steam locomotives which have been transferred to other parts of the New Haven system, and the steel bodies of the multiple-unit equipment, which would have been purchased even had not the electrification been undertaken.

Passenger Service.—All passenger service west of Stamford, Conn., is electrically operated. For the winter timetable, excluding Sundays, the schedule calls for 68 trains per day into Grand Central Terminal, two through trains terminating in Harlem River station and the same number of trains out of the Grand Central Terminal and Harlem River, or a total of 140 trains per day. The Harlem River Branch service includes 19 trains each way per day, except Sundays, between New Rochelle and Harlem River. On the New Canaan branch 16 trains are operated each way between Stamford and New Canaan. This makes a total week-day schedule of 210 trains per day. Additional trains in and out of Grand Central Terminal are operated on Saturdays, and extra trains are also run on the Harlem River branch on Sundays.

Of the 70 through trains per day between Grand Central Terminal, or Harlem River, and New Haven, 46 are electrically operated the entire distance, steam locomotives being used between New Haven and Stamford on the remaining 24 trains. Of the 210 trains per day, 114 are hauled by electric locomotives, multiple-unit equipment being used on the remaining 96 trains. There are 48 a.c.-d.c. locomotives used in passenger service. The multiple-unit equipment at the present time comprises four a.c. motor cars, 21 a.c.-d.c. motor cars, and 46 trailers.

The average number of electric train miles per day is about 6,600, of which 1,400 are made by multiple-unit equipment, the remaining being trains hauled by electric locomotives.

The passenger locomotives make an average of 8,200 miles per day, some of the individual locomotive mileage being as high as 450 to 500 miles. Forty-one of the 48 passenger locomotives

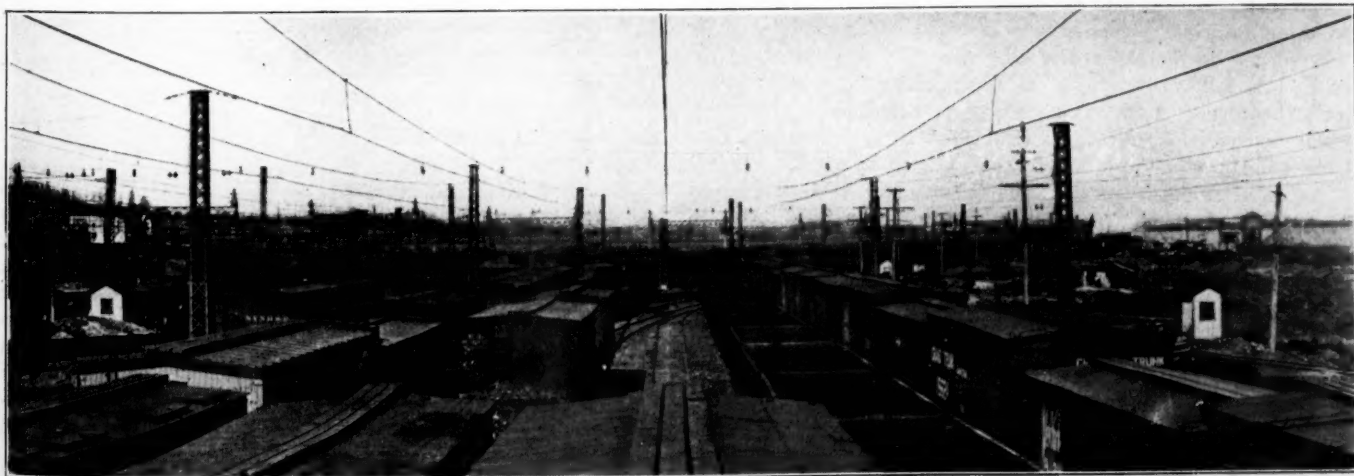


Four-Track Tangent Catenary Construction, Showing Anchor Bridge with Sectionalizing Switches Installed on It,

interest to note that of the yards electrified one includes 35 miles, the other 25 miles.

Electric power is supplied from a single station, centrally located, but this will, in a short time, be supplemented by other supplies to be applied at the east and west ends of the electrification zone. There are 100 passenger, freight and switching elec-

*From a paper presented at a joint meeting of the Franklin Institute and the Philadelphia section, American Institute of Electrical Engineers, January 20, 1915.



View in Westchester Yard, Harlem River Branch; the Cross Catenary Span in the Immediate Foreground Serves Ten Tracks

used in a.c.-d.c. service were originally designed to haul trains of 200 tons trailing weight in local service, 250 tons in local express service, and 300 tons for through express service between New York and New Haven. The remaining seven a.c.-d.c. passenger locomotives were originally designed to haul local trains of 350 tons trailing weight or express trains of 800 tons trailing weight at a maximum speed of 45 miles an hour. In actual service these locomotives attain a maximum speed of 55 miles an hour.

The multiple-unit motor cars make an average of 2,100 miles per day. The proportion of trailers to motor cars for a.c.-d.c. equipment averages two trailer cars to one motor car.

Freight Service.—There are 36 alternating current locomotives used in freight service. These are geared locomotives of 1,400 horsepower each and were designed originally to haul a trailing load of 1,500 tons in through service at 35 miles an hour, although they are used at times for heavy passenger service in the a.c. zone during the summer months, when the heating of trains is not required. Some of these a.c. locomotives are used in transfer service between Oak Point and Westchester freight yards on the Harlem River branch, others in way freight and switching service, but the majority are used on through freight trains between Harlem River and Bridgeport or New Haven. Outside of the fast freights, which are usually under 1,500 tons trailing weight, most of the freights are hauled by two locomotives, the trailing tonnage averaging from 2,500 to 3,000 tons, although, as an experiment, tests have been made in using three locomotives with trains of over 200 cars and 4,500 tons trailing weight. About 20 freight trains are hauled daily at the present time by electric locomotives between Harlem River and Bridgeport or New Haven.

Switching.—Electric switchers are used in the three main switching yards on the Harlem River branch, located at Westchester, Oak Point and Harlem River; also at Stamford, Port Chester, New Rochelle, Mt. Vernon and at Van Nest, the latter yard being principally used for storage.

At Oak Point and Harlem River the switchers are used principally for unloading and loading floats and making up trains. One switcher was placed in service in March, 1911, at Stamford, and the remaining 15 have been in operation since September, 1912. They have been highly successful in operation, and their reliability is evidenced by the fact that to date there has only been one case of grounded main motor, although the 16 locomotives have made approximately 50,000 miles each. Some of these locomotives have been at times in continuous service 24 hours a day for 30 days, the only attention received being the renewal of blower or compressor motor brushes, or contact shoe of pantograph trolley at such times as change was made of the operating crew. Four of these electric switchers have been found to do about the same work as six of the steam switchers, which they have displaced.

Our experience to date has taught us that electrification points to three principal places where economy of operation can be secured, and in the order of their importance they may be mentioned as follows: Saving in fuel; saving in motive-power maintenance and repairs; and saving in train miles.

Assets created by electrification, which may at times be controlling factors, as, for example, the reclamation of city terminal property, after the removal of gas and smoke by the elimination of steam locomotives, are of most important consideration. In cases, however, that do not involve large city terminal electrification, the general credits and debits resulting from electrification work may be said to about offset each other, and thus the value of the returns can be based upon the three items first mentioned. If we know the number of freight and passenger train miles in a division proposed for electrification, and the cost of each one of the train miles, today we can say with very little chance of error what the cost of each one of those train miles in freight and passenger service will be when that division is operated by electricity. If we were to duplicate the steam train movement by an electric train movement, a certain economy would be shown,

but by reason of the ability to concentrate in single train movements greater tractive efforts and higher speeds, greater individual tonnages can be translated, and thus the third item of economy appears in the reduction of train miles.

Experience with the movement of billions of ton miles in freight, passenger and switching service by electricity has justified the early predictions that one pound of coal burned under the boilers of a central electric power station and converted into electrical energy and transmitted to an electric engine will develop twice the drawbar pull at the same speed as a similar pound of coal burned in the firebox of a steam locomotive; and, second, that the maintenance and repairs on electric locomotives of the straight alternating-current type are on the order of one-half of those required for steam locomotives of equal weight on drivers. It is thus seen that the problem of electrification merely revolves around the question of the density of traffic in which the economies aforesaid can be practiced, and, therefore, the denser

TABLE I

| THE NEW YORK, NEW HAVEN AND HARTFORD RAILROAD COMPANY. STATISTICS OF ELECTRICAL OPERATION—NEW YORK AND SHORE LINE DIVISIONS. FOR THE MONTH OF NOVEMBER, 1914, COMPARED WITH THE MONTH OF OCTOBER, 1914. | | | | |
|---|--------------------------|-----------|--------------------------|------------|
| Cos Cob Power House. | | | | |
| | November | | October | |
| | Total | Per KWH | Total | Per KWH |
| Coal consumed (tons)..... | 12,439.44 | 2.78 lbs. | 12,280.84 | 2.75 lbs. |
| Water consumed (gallons)..... | 38,778,000 | 4.33 gal. | 35,835,000* | 4.01 gal.* |
| Cost of coal..... | \$34,084.07 | .381c | \$33,526.69 | .375c |
| Cost of water..... | 1,582.15 | .017 | 5,015.55* | .051* |
| Cost of other supplies..... | 317.20 | .004 | 655.85 | .007 |
| Maintenance of power plant and machinery..... | 3,655.27 | .041 | 3,434.87 | .038 |
| Wages and salaries..... | 6,030.62 | .068 | 6,704.00 | .075 |
| Total Cost, Maintenance and operation..... | 45,695.31 | .511 | 49,336.96* | .552* |
| Fixed charges (interest, taxes and insurance)..... | 16,106.89 | .180 | 16,106.89 | .180 |
| Total cost..... | 61,802.20 | .691 | 65,443.85* | .732* |
| Power Consumption (KWH) | | | | |
| Passenger Service (Elec. Locos.)..... | 2,894,495 | | 3,072,145 | |
| Passenger Service (M. U. Cars)..... | 630,039 | | 499,307 | |
| Freight Service..... | 1,508,306 | | 1,494,082 | |
| Switching Service..... | 984,255 | | 848,613 | |
| Non-Revenue Service..... | 10,340 | | 6,191 | |
| Total used by Electric Locomotives and Motor Cars..... | 6,027,405 | | 5,920,398 | |
| Signals..... | 107,405 | | 117,445 | |
| Other company purposes..... | 386,652 | | 399,401 | |
| Line loss..... | 543,235 | | 617,804 | |
| Total used for company purposes..... | 7,067,757 | | 7,055,048 | |
| New York, Westchester & Boston..... | 670,144 | | 630,058 | |
| Other companies..... | 1,205,699 | | 1,255,139 | |
| Total power used..... | 8,949,600 | | 8,946,245 | |
| Maximum daily output..... | | | | |
| | Tuesday, November 24th | | Friday, October 30th | |
| | 343,300 KWH | | 316,630 KWH | |
| Maximum swing..... | 30,000 KW | | 29,800 KW | |
| Maximum daily output..... | | | | |
| | Friday, Nov. 6—7:00 P.M. | | Sunday, Oct. 4—8:27 A.M. | |
| | 249,800 KWH | | 256,155 KWH | |
| Average Daily Output..... | 301,902 KWH | | 288,589 KWH | |
| Power Purchased from N. Y. C. | | | | |
| Power purchased (K.W.H.)..... | 1,244,021 | | 1,306,017 | |
| Cost of power..... | \$16,097.67 | | \$16,348.47 | |
| Cost per K.W.H. (Cents)..... | 1.294 | | 1.252 | |
| Total Power: | | | | |
| Total power consumed (K.W.H.)..... | 10,193,621 | | 10,252,262 | |
| Total cost of power (including fixed charges)..... | \$77,899.87 | | \$81,792.32* | |
| Cost per K.W.H. (cents) (charges)..... | .764 | | .798* | |
| *Revised. | | | | |

the traffic the greater the requisite motive power for its movement, and hence the greater the saving to be effected.

It is perfectly possible to keep the maintenance and repairs of the electric locomotive down to one-half of those of steam under the most favorable conditions of steam maintenance, and in many cases below this figure. On the other hand, due to the peculiar nature of the electric engine, which has not as yet been enough appreciated, it will be only by the most rigorous and careful inspection and conformity to rules of operation that this relation can be maintained. Indeed, if electric engines be treated as has been the custom of treating steam locomotives, then their repairs, instead of costing far less, will cost far more than those of the steam engine.

An inheritance by the New Haven of the old steam locomotive engineers for the operation of their electric engines is a case

where the tail of the dog wags the body. While it is a good argument that these men understand the roadbed and signals better than anyone else, this argument fails when engineers without electrical experience or training can bid in the electric runs, depending upon their seniority and record of service. The condition might be alleviated by one set of men, once in remaining in; but there is a constant change, and it is a long time before the steam locomotive engineer divorces himself from the fact that he is not operating a steam locomotive. During his period of learning how to operate the electric engine he does not suffer, the people do not suffer, but the road suffers, and the locomotive suffers most. Here, therefore, we see the necessity of electrically trained men.

While all of the main line tracks of the New York division are electrified, there still remains in passenger and freight service,

as the statistics of electrical operation, and give operating information with reference to:

1. The amount, distribution and cost of electric power generated at Cos Cob station. (Table I.)
2. Statistics and operating costs of electric passenger service.
3. Statistics and operating costs of electric freight service.
4. Statistics covering line and equipment failures.

I would ask those who review these statistics with an analytical eye to bear in mind that they are taken from an electrical plant which, from its inception, has been handicapped both from a construction and operating point of view. The underlying principle applying to the New Haven electrification required that its motive power equipment be designed to operate on both alternating and direct-current power, and that, further, on account of inadequate shop facilities in the past it has been necessary, since

TABLE II

| STATISTICS OF ELECTRICAL OPERATION NEW YORK AND SHORE LINE DIVISIONS. MONTH OF NOVEMBER, 1914, COMPARED WITH MONTH OF OCTOBER, 1914. | | | | | | | | | | | | | | |
|---|--------------------|------------|------------|------------|---------------------|-----------|-----------------------|-----------|----------------------|-----------|-----------|-----------|-------|--------|
| Passenger Service. | | | | | | | | | | | | | | |
| | Express trains. | | | | Local trains | | | | Multiple unit trains | | | | | |
| | Eastbound | | Westbound | | Eastbound | | Westbound | | Eastbound | | Westbound | | | |
| | November | October | November | October | November | October | November | October | November | October | November | October | | |
| Train miles..... | 49,436 | 59,385 | 53,768 | 54,032 | 29,128 | 32,941 | 23,839 | 28,622 | 21,569 | 19,338 | 22,552 | 19,363 | | |
| Locomotive miles..... | 82,298 | 85,220 | 88,898 | 89,162 | 41,148 | 45,008 | 31,558 | 39,722 | 29,937 | 28,504 | 32,220 | 28,857 | | |
| Car Miles..... | 386,883 | 404,166 | 410,574 | 425,363 | 157,770 | 182,564 | 137,502 | 172,338 | 76,544 | 74,004 | 79,292 | 72,793 | | |
| Ton miles..... | 23,880,554 | 24,483,292 | 24,654,186 | 25,697,939 | 7,314,489 | 8,444,023 | 6,432,307 | 7,812,994 | 5,093,352 | 4,755,814 | 5,296,525 | 4,634,919 | | |
| K. W. H. used..... | 1,120,801 | 1,133,588 | 1,231,060 | 1,220,947 | 643,284 | 719,423 | 524,871 | 651,374 | 346,385 | 305,267 | 341,496 | 279,137 | | |
| Locomotive miles per train mile..... | 1.66 | 1.69 | 1.65 | 1.65 | 1.41 | 1.37 | 1.32 | 1.39 | 1.39 | 1.47 | 1.43 | 1.49 | | |
| Car miles per train mile..... | 7.83 | 8.02 | 7.64 | 7.87 | 5.42 | 5.54 | 5.77 | 6.02 | 3.55 | 3.83 | 3.52 | 3.76 | | |
| K. W. H. per train mile..... | 22.67 | 22.50 | 22.90 | 22.60 | 22.09 | 21.84 | 22.02 | 22.76 | 16.06 | 15.79 | 15.14 | 14.42 | | |
| K. W. H. per locomotive mile..... | 13.62 | 13.30 | 13.85 | 13.70 | 15.63 | 15.08 | 16.63 | 16.40 | 11.57 | 10.71 | 10.60 | 9.67 | | |
| K. W. H. per car mile..... | 2.90 | 2.80 | 3.00 | 2.87 | 4.08 | 3.94 | 3.82 | 3.78 | 4.53 | 4.12 | 4.31 | 3.83 | | |
| K. W. H. per 1,000-ton mile..... | 46.93 | 46.30 | 49.93 | 47.51 | 87.95 | 85.20 | 81.60 | 83.37 | 68.01 | 64.19 | 64.48 | 60.22 | | |
| Operating Costs. | | | | | | | | | | | | | | |
| | Locomotive repairs | | Power | | Locomotive Supplies | | Engine house Expenses | | Enginemen | | Trainmen | | Total | |
| | Nov. | Oct. | Nov. | Oct. | Nov. | Oct. | Nov. | Oct. | Nov. | Oct. | Nov. | Oct. | Nov. | Oct. |
| Trains hauled by locomotives: | | | | | | | | | | | | | | |
| Cost per train mile (cents)..... | 17.15 | 13.80 | 19.33 | 19.89* | 2.23 | 1.53 | .57 | .54 | 8.81 | 8.37 | 9.51 | 9.55 | 57.60 | 53.68* |
| Cost per locomotive mile (cents)..... | 10.61 | 8.56 | 11.96 | 12.29* | 1.39 | .95 | .38 | .34 | 5.41 | 5.20 | 5.88 | 5.91 | 35.63 | 33.25* |
| Cost per car mile (cents)..... | 2.45 | 1.93 | 2.76 | 2.79* | .32 | .21 | .08 | .08 | 1.26 | 1.17 | 1.36 | 1.34 | 8.23 | 7.52* |
| Multiple unit trains: | | | | | | | | | | | | | | |
| Cost per train mile (cents)..... | 15.27 | 11.83 | 11.39 | 11.42* | .24 | .16 | .91 | .78 | 5.17 | 5.20 | 8.84 | 7.53 | 41.82 | 36.92* |
| Cost per motor car mile (cents)..... | 10.51 | 7.98 | 7.84 | 7.70* | .17 | .11 | .62 | .53 | 3.56 | 3.51 | 6.08 | 5.08 | 28.78 | 24.91* |
| Cost per car mile (cents)..... | 4.32 | 3.12 | 3.22 | 3.01* | .07 | .04 | .25 | .21 | 1.46 | 1.37 | 2.52 | 1.98 | 11.85 | 9.73* |
| *Revised. | | | | | | | | | | | | | | |

*Revised.

as previously shown, a considerable amount of steam operation, made necessary by the New Haven having had to avoid capital expenditure for power house and motive power equipment. It can be readily understood that a large reduction in operating expense can be effected when the division is placed on a 100 per cent electrical basis.

OPERATING RESULTS

Essentially necessary is a wholesome confidence on the part of railroads undertaking electrification that the result predicted will be attained, and what we are doing on the New Haven today electrically from an operating standpoint could not be better epitomized than by the presentation of one of the last monthly operating reports. They are shown herewith, and are known

securing new shop facilities, to make very heavy repairs throughout the entire electric motive power of the road. I have, therefore, to offer this word of caution in analyzing the statistics that are presented, for it is to be noted that the cost of locomotive repairs is high. For example, referring specifically to the table of operating costs of electric passenger engines, Table II, it is to be noted that in the month of October the repairs are recorded as 8.56 cents per locomotive mile, while for November these repairs have increased to 10.61 cents per locomotive mile. At first this would seem to indicate that the new shop facilities were increasing rather than diminishing maintenance costs. This, however, may be explained by the fact that all of the passenger engines have been undergoing general repairs, and invoices for material were passed in greater amounts for November than for October. Many

of the electric locomotives have not received a general overhauling since 1907, and during this time their log sheets of operation show some of the locomotives have made over 350,000 miles.

Showing, however, what can be done with electrical equipment under the care of a better maintenance, I present in Table III monthly costs and mileages for one of these locomotives made since these engines have passed through the shops. Notwithstanding the engines are of the alternating current-direct current type, it is of interest to note that their records so far show an average

TABLE III

| PERFORMANCE OF N. Y., N. H. AND H. R. E. ELECTRIC PASSENGER LOCOMOTIVE 032. | | | | | | |
|---|--------|--------|--------|---------|---------|--------|
| | 1913 | | | | | |
| | July | Aug. | Sept. | Oct. | Nov. | Dec. |
| Labor..... | 32.90 | 83.01 | 61.59 | 23.67 | 20.18 | 89.17 |
| Material..... | 20.68 | 38.61 | 67.96 | 21.64 | 34.56 | 104.86 |
| Total labor and material..... | 53.58 | 121.62 | 129.55 | 45.31 | 54.74 | 194.03 |
| Mileage..... | 4802 | 5517 | 4695 | 4716 | 4687 | 4592 |
| Cost per mile..... | .011 | .022 | .028 | .010 | .012 | .042 |
| Average cost per mile..... | .011 | .017 | .020 | .018 | .017 | .021 |
| Total miles to date..... | 4,802 | 10,319 | 15,014 | 19,730 | 24,418 | 29,005 |
| | 1914 | | | | | |
| | Jan. | Feb. | Mar. | April | May | June |
| Labor..... | 200.97 | 85.94 | 36.52 | 65.42 | 91.01 | 70.70 |
| Material..... | 95.79 | 27.12 | 29.15 | 32.57 | 70.01 | 90.28 |
| Total labor and material..... | 296.76 | 113.06 | 65.67 | 97.99 | 161.02 | 160.98 |
| Mileage..... | 4,392 | 6,017 | 5,310 | 5,270 | 5,889 | 5,839 |
| Cost per mile..... | .068 | .019 | .012 | .019 | .027 | .028 |
| Average cost per mile..... | .027 | .026 | .024 | .024 | .024 | .024 |
| Total miles to date..... | 33,397 | 39,414 | 44,724 | 49,995 | 55,884 | 61,723 |
| | 1914 | | | | | |
| | July | Aug. | Sept. | Oct. | Nov. | Dec. |
| Labor..... | 212.36 | 74.45 | 147.53 | 219.47 | 55.25 | ..... |
| Material..... | 131.49 | 150.72 | 173.96 | 780.92 | 146.09* | ..... |
| Total labor and material..... | 343.85 | 225.17 | 321.49 | 1000.39 | 201.34* | ..... |
| Mileage..... | 6,165 | 7,401 | 5,459 | 5,678 | 6,714 | ..... |
| Cost per mile..... | .056 | .031 | .058 | .176 | 0 | ..... |
| Average cost per mile..... | .027 | .027 | .030 | .039 | .036 | ..... |
| Total miles to date..... | 67,888 | 75,289 | 80,748 | 86,426 | 93,140 | ..... |

NOTE.—Cost in dollars.

* Cr.

cost of under five cents per locomotive mile. It is of particular interest to note that locomotive No. 032, which received its overhaul first, has now operated 93,140 miles at an average cost of 3.6 cents per locomotive mile.

The maintenance figures for the 10 engines first through the shops give a sharp contrast to those in the general table of passenger engine operating costs (Table II) and emphasize the lack of maintenance to which the electric locomotives were subjected in the early days of their operation. Had conditions permitted

TABLE IV

| STATISTICS COVERING ELECTRIC PASSENGER MOVEMENT AND "POWER RATE" CONSTANTS FOR DIFFERENT SERVICES—EASTBOUND. | | | | | | |
|--|--------------------------|------------------|----------------|---------------------|---------------------|------------|
| | New Haven express trains | Stamford express | Stamford local | Port Chester trains | New Rochelle trains | Total |
| Number of trains..... | 52 | 901 | 667 | 185 | 2 | 1807 |
| Number of locomotives..... | 84 | 1407 | 859 | 214 | 2 | 2566 |
| Number of cars..... | 497 | 7,054 | 3,875 | 1,000 | 10 | 12,436 |
| Tonnage..... | 35,025 | 566,033 | 279,904 | 67,884 | 619 | 950,065 |
| Train miles..... | 3,120 | 18,921 | 14,003 | 2,405 | 8 | 38,457 |
| Locomotive miles..... | 5,048 | 30,954 | 18,894 | 2,889 | 8 | 57,793 |
| Car miles..... | 29,394 | 148,134 | 80,263 | 13,000 | 40 | 270,741 |
| Ton miles..... | 2,168,700 | 11,886,253 | 5,832,923 | 882,492 | 2,450 | 20,712,824 |
| K. W. H. used..... | 66,070 | 405,815 | 343,840 | 58,933 | 22 | 874,912 |
| W. H. Pr. T. M..... | 31.4 | 34.2 | 59.0 | 66.7 | 90.2 | 42.2 |

Stamford local trains include one train, New Rochelle to Stamford.

our electric passenger engines to be of the straight alternating-current design, in my opinion their average maintenance would not have exceeded four cents per locomotive mile.

During the past six years of electric operation there have been collected some very valuable data with regard to the amount of power required to operate trains of variable tonnage in passenger, freight and switching service. Based on this data,

the power required to operate trains under normal or peak conditions of schedule can be calculated with results practically coinciding with the estimates.

By means of wattmeters installed on all locomotives and motor cars it has been possible to record the differences of power required by trains operating under local and express conditions. The long period over which these statistics were kept and power rate constants thus developed has permitted us to abandon an elaborate tabulation and consolidate the information in a more general statement. Of value to those who are interested to follow more closely these results, Tables IV, V and VI will be of assistance. These tables are compiled from the June, 1914, statistics of electric passenger and freight train operation between Woodlawn and points east to New Haven. At that time the overhead system had only recently been completed to New

TABLE V

| STATISTICS COVERING ELECTRIC PASSENGER MOVEMENT AND "POWER RATE" CONSTANTS FOR DIFFERENT SERVICES—WESTBOUND. | | | | | | |
|--|--------------------------|------------------|----------------|---------------------|---------------------|------------|
| | New Haven express trains | Stamford express | Stamford local | Port Chester trains | New Rochelle trains | Total |
| Number of trains..... | 49 | 958 | 604 | 185 | 0 | 1,796 |
| Number of locomotives..... | 78 | 1,502 | 791 | 185 | ..... | 2,556 |
| Number of cars..... | 434 | 6994 | 3941 | 972 | ..... | 12,341 |
| Tonnage..... | 31,903 | 574,599 | 261,202 | 62,559 | ..... | 930,263 |
| Train miles..... | 4,620.5 | 33,044 | 17,402 | 2,497.5 | ..... | 57,564 |
| Locomotive miles..... | 24,855.5 | 146,870 | 81,676 | 12,591 | ..... | 205,092.5 |
| Car miles..... | 1,899,957 | 12,065,689 | 5,441,943 | 811,539 | ..... | 20,219,128 |
| Ton miles..... | 60,900 | 486,203 | 346,935 | 62,734 | ..... | 956,772 |
| K. W. H. used..... | 32.0 | 40.3 | 63.7 | 77.3 | ..... | 47.4 |

Haven, and there was but a small percentage of electric service, both as regards passenger and freight between Woodlawn and New Haven. While the tonnage in both passenger and freight service has been greatly increased since that time, these tables, however, may be taken as giving reliable data in connection with the electric train movements recorded. The watt hours per ton mile (abbreviated in tables as W.H.P.T.M.) are secured through meters recording input power to the electric motors. To determine the actual amount of power taken from the contact wire, these figures should be divided by 97 per cent, thus allowing an average loss of 3 per cent for the step-down transformers installed on the electric engines and motive power. As examples of the increments of electric service, since the extension of the electrification to New Haven, while it is to be noted that the total electric passenger ton-miles for June, 1914, were approximately 41,000,000, and that of the freight 9,400,000, the former has now increased to 62,000,000, and the latter to 44,000,000.

Of special interest to the writer with regard to the tables covering electric passenger operation is the variation in watt hours per ton-mile for the various express and local services.

TABLE VI

| STATISTICS COVERING ELECTRIC FREIGHT MOVEMENT AND "POWER RATE" CONSTANTS FOR EASTBOUND AND WESTBOUND SERVICE. | | | |
|---|-----------|-----------|-----------|
| | Eastbound | Westbound | Total |
| Number of trains..... | 109 | 116 | 225 |
| Number of locomotives..... | 109 | 117 | 226 |
| Number of Cars..... | 2,939 | 2,829 | 5,768 |
| Tonnage..... | 106,905 | 86,706 | 193,611 |
| Train miles..... | 5,273 | 5,564 | 10,837 |
| Locomotive miles..... | 5,486 | 5,784 | 11,270 |
| Car miles..... | 142,542 | 135,792 | 278,334 |
| Ton miles..... | 5,184,893 | 4,161,888 | 9,346,781 |
| K. W. H. used..... | 170,259 | 137,048 | 307,307 |
| W. H. Pr. T. M..... | 32.8 | 33.0 | 32.9 |

For example, it is to be noted that the power rate for New Haven express trains eastbound is 31.4 watt hours per ton-mile, this rate being increased slightly for trains operating to Stamford; the rate rises quite rapidly for trains operating in local service to Stamford, and continues to rise for local trains operating to Port Chester and New Rochelle respectively. It is, of course, well known that the rate of power supply per ton for express operation is very much lower than that required for local operation, as in the case of the latter the train suffers,

under the conditions of braking, the loss of the kinetic energy stored in it under the conditions of acceleration. The increasing watt hours per ton-mile as shown in the tables are practically proportional to the diminishing distance between train stops. It may also be said that the distance between stops increases progressively east of New York City, and if, for example, suburban territory under consideration for electrification has to be served by train schedule with distances between stations approximately the same as those obtaining on the New Haven Road, the "power rate" constants as shown in these tables will be found to be sufficiently accurate in the study of power necessary to train movement.

In the tabulated statistics covering electric freight operation the point of principal interest is the difference between the rate per ton-mile as indicated in the June tabulation as against those

of heavy freight trains. It was first thought that when these large train units were placed on the line the power house would be subjected to very heavy drafts of power under conditions of accelerating them. The reverse, however, was found to be the case, and where, previous to the operation of these trains, the power station output curve showed peaks of a fluctuating character, these heavy trains have served to smooth out the curve of power station output. A reasonable explanation of this would seem to rest in the fact that when a number of the heavy trains are under translation, and it becomes necessary to accelerate one from rest, the supply of current necessary to this acceleration, while not reducing the line voltage materially, does so, however, to a point which corresponds to a speed of the trains in translation lower than the speed at which they are actually operating, and thus these heavy trains, by their own mass energy, as in the

TABLE VII

STATISTICS OF ELECTRICAL OPERATION—NEW YORK AND SHORE LINE DIVISIONS.
MONTH OF NOVEMBER, 1914, COMPARED WITH MONTH OF OCTOBER, 1914.
Freight Service.

| | Fast freight. | | | | Slow Freight | | | | Local Freight | | | |
|--------------------------------------|---------------|-----------|-----------|-----------|--------------|------------|------------|------------|---------------|-----------|-----------|-----------|
| | Eastbound | | Westbound | | Eastbound | | Westbound | | Eastbound | | Westbound | |
| | November | October | November | October | November | October | November | October | November | October | November | October |
| | November | October | November | October | November | October | November | October | November | October | November | October |
| Train miles..... | 3,283 | 3,484 | 4,954 | 7,576 | 8,485 | 9,177 | 6,152 | 4,880 | 2,880 | 3,240 | 2,933 | 3,240 |
| Locomotive miles..... | 3,283 | 3,486 | 8,042 | 11,128 | 16,529 | 18,038 | 11,269 | 9,824 | 2,956 | 3,321 | 3,012 | 3,321 |
| Loaded car miles..... | 130,147 | 140,202 | 159,377 | 219,435 | 484,644 | 529,559 | 203,556 | 209,889 | 29,965 | 33,893 | 32,990 | 37,339 |
| Empty car miles..... | 335 | 203 | 60,545 | 106,040 | 57,346 | 59,801 | 184,978 | 177,831 | 16,304 | 16,339 | 12,072 | 20,456 |
| Caboose miles..... | 3,283 | 3,484 | 4,954 | 7,576 | 8,485 | 9,177 | 6,152 | 4,880 | 2,880 | 3,240 | 2,933 | 3,240 |
| Ton miles..... | 4,399,743 | 4,589,492 | 5,941,893 | 8,677,627 | 21,121,401 | 22,885,161 | 10,496,232 | 10,448,521 | 1,301,163 | 1,414,569 | 1,432,065 | 1,702,877 |
| K. W. H. used..... | 108,749 | 112,033 | 186,401 | 265,088 | 566,983 | 571,972 | 340,830 | 294,602 | 118,423 | 110,757 | 106,650 | 114,828 |
| Locomotive miles per train mile..... | 1.00 | 1.00 | 1.62 | 1.47 | 1.95 | 1.97 | 1.83 | 2.01 | 1.03 | 1.03 | 1.03 | 1.03 |
| Loaded car miles per train mile..... | 39.64 | 40.24 | 32.17 | 28.96 | 57.12 | 57.71 | 33.09 | 43.01 | 10.40 | 10.46 | 11.25 | 11.52 |
| Empty car miles per train mile..... | 1.10 | 1.06 | 13.22 | 15.00 | 7.76 | 7.52 | 31.07 | 37.44 | 6.66 | 6.04 | 5.12 | 7.31 |
| Ton miles per train mile..... | 1,340.16 | 1,317.31 | 1,199.41 | 1,145.41 | 2,489.26 | 2,493.75 | 1,706.15 | 2,141.09 | 451.79 | 436.60 | 488.26 | 525.58 |
| Ton miles per locomotive mile..... | 1,340.16 | 1,316.55 | 738.86 | 779.80 | 1,277.84 | 1,268.72 | 931.43 | 1,063.57 | 440.18 | 426.55 | 475.45 | 512.76 |
| Percentage of tonnage to rating..... | 96% | 95% | ..... | ..... | 94% | 93% | ..... | ..... | ..... | ..... | ..... | ..... |
| Ton miles per hour..... | 26,779 | 27,335 | 19,109 | 18,092 | 26,008 | 27,912 | 18,637 | 23,297 | 2,614 | 2,679 | 3,423 | 3,622 |
| Average Speed (m. p. h.)..... | 19.98 | 20.75 | 15.93 | 15.79 | 10.45 | 11.19 | 10.92 | 10.88 | 5.79 | 6.14 | 7.01 | 6.89 |
| K. W. H. per train mile..... | 33.12 | 32.16 | 37.63 | 34.99 | 66.82 | 62.32 | 55.40 | 60.37 | 41.12 | 34.18 | 36.36 | 35.44 |
| K. W. H. per locomotive mile..... | 33.12 | 32.11 | 23.18 | 23.82 | 34.30 | 31.71 | 30.24 | 29.99 | 40.06 | 33.35 | 35.41 | 34.58 |
| K. W. H. per car mile..... | .81 | .78 | .83 | .80 | 1.03 | .96 | .86 | .75 | 2.41 | 2.07 | 2.22 | 1.88 |
| K. W. H. per 1,000-ton miles..... | 24.72 | 24.41 | 31.37 | 30.54 | 26.84 | 24.99 | 32.47 | 28.20 | 91.01 | 78.29 | 74.47 | 67.43 |

Ton miles are based on weight of trailing load.

Percentage of tonnage to rating is found by dividing the total tonnage of trains as they leave terminals.
Ton miles per hour is found by dividing ton-miles by the total running time of trains between terminals.
Average speed is found by dividing train-miles by total running time of trains between terminals.

Harlem River by the rating of locomotive hauling those trains.

Operating Costs.

| | Locomotive repairs | | Power | | Locomotive Supplies | | Engine house Expenses | | Enginemen | | Trainmen | | Total | |
|---------------------------------------|--------------------|-------|-------|--------|---------------------|------|-----------------------|------|-----------|-------|----------|-------|-------|--------|
| | Nov. | Oct. | Nov. | Oct. | Nov. | Oct. | Nov. | Oct. | Nov. | Oct. | Nov. | Oct. | Nov. | Oct. |
| Cost per train mile (cents)..... | 15.51 | 15.98 | 28.51 | 27.90* | .54 | .63 | .48 | .58 | 10.66 | 10.44 | 17.83 | 17.46 | 73.53 | 72.99* |
| Cost per locomotive mile (cents)..... | 9.69 | 10.19 | 17.82 | 17.79* | .34 | .40 | .30 | .37 | 6.67 | 6.66 | 11.14 | 11.13 | 45.96 | 46.54* |
| Cost per 1,000-ton miles (cents)..... | 9.95 | 10.16 | 18.30 | 17.73* | .35 | .40 | .31 | .37 | 6.84 | .663 | 11.45 | 11.09 | 47.20 | 46.38* |

* Revised.

shown under the general tabulation of freight service (Table VII), where it is to be noted that the kilowatt hours for fast and slow freight are, on the average, considerably below 30 watt hours per ton mile, this rate being based upon the tonnage of the trailing load. Allowing for the weight of the electric engine, the watt hours per ton-mile will be reduced to 26, and, as some 200,000,000 ton-miles have been actually recorded by meter registration in freight service, it may be said that 30 watt hours per ton mile on level track is a reliable figure, with slight margin to cover electric freight operation in a combination of fast and slow service; i.e., without stops for trains averaging between 1,500 and 3,000 tons trailing load.

It is of interest at this juncture to point to an interesting experience we have had in connection with the electrical opera-

case of a flywheel, automatically release a large amount of power, which becomes available for the accelerating train.

The matter of savings to be effected in engine repairs are subject to local conditions, for, while it may be said that steam locomotive repairs, upon an average, may be placed at 10 cents per locomotive mile, on the other hand there may be situations where the railroad has, for example, to use water of severe scaling characteristics and thus run up the cost of repairs excessively.

In the matter of train miles the savings to be effected are dependent upon local conditions, but it can be stated as a general conclusion, based on a very considerable experience, that electric engines of the order of 100 tons on drivers should be maintained at a rate not exceeding five cents per locomotive mile,

and that the coal bill for transportation is cut to at least one-half.

Having determined for any situation what savings can be effected by the substitution of electricity for steam, then, as previously stated, the commercial justification of a change to the new motive power is entirely based upon whether these savings will cover the interest, insurance, depreciation and taxes on the electrical investment necessary.

The motive power feature of electrification, like its other parts, has virtually reached the pound stage. Electric locomotives of approximately 100 tons will, under present conditions of cost of labor and material, vary between 18 cents and 20 cents per pound. This figure is practically irrespective of speed-torque characteristics, a high-speed passenger locomotive and a low-speed switcher not varying greatly in cost upon a pound basis. Multiple-unit cars, now usually built of steel, do not vary greatly

ing the success of main line electrification in the fact that it is the density of traffic and in the use of a large number of electric engines by which we can save enough money to pay for the capital expenditure necessary to the supply of power to them for the operation of many trains.

In conclusion, I would plead for an especially conservative point of view on the part of the public with regard to electrification. While the savings to be effected under certain conditions of electrification may be considerable, on the other hand the construction investment necessary to these savings may be very great. So many roads in this country have either passed or lowered their dividends that it is hardly necessary to emphasize the fact that only a healthy condition of finance throughout the country will warrant the consideration of electrification, and again I would say that partial electrification, such as that applying to yards only and not main line, while it might prove of

TABLE VIII

| STATISTICS OF ELECTRICAL OPERATION— NEW YORK AND SHORE LINE DIVISIONS. FOR THE MONTH OF NOVEMBER, 1914, COMPARED WITH THE MONTH OF OCTOBER, 1914. | | | | | | | | | | | | | | | | |
|--|-----------------------------|-------------|-------------------|-------------|---------------------|-------------|--------------------|-------------|-----------------|-------------|----------------------|-------------|-------------------------------|-------------|----------------|-------------|
| Line and Equipment Failures. | | | | | | | | | | | | | | | | |
| | Line failures | | | | | | | | | | | | | | | |
| | Catenary insulator failures | | Dead end failures | | Other line failures | | Equipment failures | | Signal failures | | Outside interference | | Failures of employees | | Total failures | |
| | Nov. | Oct. | Nov. | Oct. | Nov. | Oct. | Nov. | Oct. | Nov. | Oct. | Nov. | Oct. | Nov. | Oct. | Nov. | Oct. |
| | No. | Total Delay | No. | Total Delay | No. | Total Delay | No. | Total Delay | No. | Total Delay | No. | Total Delay | No. | Total Delay | No. | Total Delay |
| Between Woodlawn and Stamford.... | 1 | 22 | 1 | 14 | .. | .. | 1 | .. | 1 | 8 | .. | .. | 1 | .. | 4 | 22 |
| Between Stamford and New Haven.... | 2 | .. | .. | .. | .. | .. | 3 | 41 | 4 | 47 | 6 | 141 | 5 | 23 | 14 | 197 |
| On New Canaan Branch..... | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| On Harlem River Branch..... | .. | .. | .. | .. | 1 | 13 | 1 | 7 | .. | .. | .. | .. | .. | .. | 1 | 13 |
| In Yards..... | .. | .. | .. | 3 | 1 | .. | 2 | 7 | 4 | .. | 4 | 28 | 1 | .. | 10 | 35 |
| Total..... | 3 | 22 | 1 | 14 | 3 | 1 | 7 | 61 | 10 | 62 | 10 | 169 | 7 | 166 | 29 | 267 |
| | | | | | | | | | | | | | | | | |
| Equipment Failures. | | | | | | | | | | | | | | | | |
| Class of service | Heated parts | | Broken parts | | Grounds | | Miscellaneous | | Total failures | | Miles per failure | | Minutes detention per failure | | | |
| | Nov. | Oct. | Nov. | Oct. | Nov. | Oct. | Nov. | Oct. | Nov. | Oct. | Nov. | Oct. | Nov. | Oct. | | |
| | | | | | | | | | | | | | | | | |
| Passenger..... | 1 | 4 | 2 | 1* | 20 | 25* | 12 | 6 | 35 | 36* | 7,071 | 7,328* | 11 | 13* | | |
| Freight..... | 1 | 2 | 1 | 2 | 3 | 2 | 0 | 1 | 5 | 7 | 13,183 | 9,506 | 56 | 60 | | |
| Switch..... | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 40,964 | 39,624 | 0 | 0 | | |
| Multiple..... | 3 | 0 | 2 | 1* | 2 | 0 | 11 | 11 | 18 | 12* | 3,554 | 4,331** | 18 | 7* | | |
| Total..... | 5 | 6 | 5 | 4* | 25 | 27* | 23 | 18 | 58 | 55* | 7,213 | 7,672* | 17 | 18* | | |

from the above figures, but, if anything, may be quoted as being slightly higher in cost per pound. As a concrete example, I would say that a first-class, high-speed, 100-ton, straight alternating-current electric passenger locomotive, capable of handling a 250-ton trailing load in normal large city suburban service, should cost \$40,000. A steam locomotive which would do the same work would probably not cost more than \$15,000, but the savings effected due to the greater operating economy of the electric engine would represent a figure of twice or three times the amount invested in the electric engine. Thus we might say that for every electric engine we purchase we would be justified at least in making a capital investment of \$40,000 to cover the cost of electric power houses and transmission equipment necessary to supply that electric engine with current. By this reasoning we again approach the answer as to the conditions affect-

advantage to a public, might at the same time prove to be a serious and unfair burden for the railroad to carry.

PRUSSIAN STATE RAILWAYS.—In a semi-official communication just issued in Berlin, the communal authorities are warned, in making up their revenue estimates, not to count on receiving any communal income tax from the Prussian state railways on account of lines passing through their districts. The communication says that, while there has recently been some increase in the railway earnings, the falling off in the receipts during the first month of the war was so great as to leave little prospect of a credit balance for the year, and the communes must therefore not count on getting anything from them for the fiscal year 1915.

Public Regulation of Wages of Railway Employees*

Expert Arbitrators Needed; What Is the Base of Reasonable Compensation? Should Arbitration Be Compulsory

BY FRANK HAIGH DIXON

Professor of Economics at Dartmouth College

"The food and clothing of our people, the industries and the general welfare of the nation, cannot be permitted to depend upon the policies and the dictates of any particular group of men, whether employers or employees, nor upon the determination of a group of employers and employees combined. The public utilities of the nation are of such fundamental importance to the whole people that their operation must not be interrupted, and means must be worked out which will guarantee this result."

These concluding words of the arbitrators in the dispute between the locomotive engineers and the railways in 1912 give warning of a situation to which the public has been singularly indifferent. The railway provides a service which is a necessity of the entire people, and the interruption of this service is a national calamity. Wage increases in this industry are usually sooner or later shifted to the shoulders of the people at large in the form of increased rates. The public's interest in railway labor controversies is supreme, and should assert itself far more effectively than it has thus far in the consideration or adoption of any plans for wage regulation.

There are today on the payrolls of the railways of the United States nearly two million men, who receive in wages annually a billion four hundred million dollars. Forty-five per cent of the gross revenues of the carriers is paid out again in wages; and of the total expense of operating all the railways in the country, nearly 65 per cent is chargeable to labor.

This great body of wage earners is by no means homogeneous. Its membership ranges all the way from the alert, intelligent, well-paid engineer down to the shifting class of day laborers engaged in track work. Neither are all classes organized to the same degree of efficiency and power. The bargaining strength of the great mass of track workers amounts to little. Above these, but below the top, is a considerable group of occupations with organizations that are generally affiliated with the American Federation of Labor, such as the wood and metal workers, machinists, signalmen, clerks and station agents. Finally at the top are the four brotherhoods directly engaged in train service. Although these four unions contain not quite a fifth of the whole number of employees, they represent the dominant element in the railway labor world, and it is largely in connection with them that experiments in wage regulation have been tried out in this country.

THE TENDENCY TOWARD STANDARDIZATION

Concerted movements among employees in train service began in 1907, and have grown in frequency until now, except for minor local grievances, they may be said to be well-nigh the only method by which the demands of the brotherhoods are presented. At first the roads resisted, but the brotherhoods became so effective in such cases in securing the same results from the roads successively that they would have obtained from them collectively that the railways gave up the fight, and have for several years conducted their important negotiations as a group. Territorial controversies have now become the rule, and have such strategic advantage for the men that they are not likely to be abandoned. One territory is now matched against another where formerly it was one road against another. The most significant result has been the marked movement toward complete standardization of wages and working conditions throughout the territory involved. The railways have resisted this

movement on the ground that differences in physical characteristics of roads, in traffic density, and in ability to pay have made complete standardization inequitable. It has been generally held by arbitrators that a worker is entitled to his hire, that if a road cannot pay a proper wage it must seek relief in an enhancement of its earnings, and that the public will not permit a road to furnish an inferior service through the employment of an inferior grade of men at wages below the prevailing level. This position must be accepted as sound. There is likewise much in the contention of the employees that many of the weaker roads are so interlocked with the more prosperous ones that their inability to pay standard wages is more apparent than real.

Whether or not there is justification also for disregarding differences in physical and traffic characteristics on different roads, which heretofore have been important considerations in the determination of rates of pay, this much is clear: Such disregard is tantamount to unfair discrimination among employees. It is a disregard of the individual in the larger strategic interest of the organization as a whole.

That the brotherhoods have in mind ultimately a national standard of wages and working conditions, there is some evidence, but a national movement will not be inaugurated until it is found to be strategically advantageous. The first duty of the unions while in the midst of a conflict is to win their case, and they use such arguments as are most effective at the moment. The argument for national standardization was urged by the conductors and trainmen because they were trying to raise the eastern wages up to the level of the west. When they reach the west they are very likely to lay stress on the greater cost of living in that territory, and to insist upon a restoration of the previously existing differential in favor of the western area. The result of it all is to raise the lower end of the wage scale and to smooth out many of the differences in working conditions on different roads and in different territories.

A further movement is now in progress to secure the association of all the brotherhoods in one united demand upon the roads. On more than twenty-five railway systems federation of the four brotherhoods is in effect, and on others working agreements exist between two or three of these organizations. Recently the articles of federation of these four unions have been revised to permit co-operation with other organizations whose membership is exclusively employed by railway companies, such as the telegraphers and railway clerks. For a number of years the conductors and the trainmen have co-operated in their wage demands. The present association of the engineers and firemen in a joint movement in the west may well be considered, in the light of earlier unhappy relations, as a fraternization of the lion and the lamb. Faced by this new ideal of a united labor force in an undivided country, the public may well give heed and devote its best thought to a consideration of its own interest in the outcome.

REGULATION UNDER FEDERAL LAW

The first important federal statute which attacked the railway wage problem was the so-called Erdman act enacted in 1898. The statute covered interstate railways and employees engaged in train service. It designated as mediators two federal officials, the Commissioner of Labor and the chairman of the Interstate Commerce Commission. As controversies assumed larger dimensions and the concerted movement became a regular and apparently a permanent method of negotiation, it was realized that a board of three members, in which the decision lay

*From a paper presented before the American Economic Association.

with one man alone, was too small a body to which to entrust issues of such magnitude. This was the motive for replacing the Erdman act in 1913 with the so-called Newlands act. Certain changes in the form of procedure long recognized as needed were also adopted. The Newlands act provides first for mediation by a board of mediation and conciliation consisting of a permanent commissioner and two other government officials. They are given the power not possessed by the former mediators of proffering their services. In case the controversy goes to arbitration, the board may consist of six members rather than three, if the parties prefer—two representing each side and two intermediaries chosen by a majority vote of the four. In case of failure to choose in this manner, the selection is made by the federal mediators.

We have therefore witnessed in this country a series of concerted movements extending over great stretches of territory and covering the period from 1907 to the present time, in which four different methods of settlement have been applied: Mediation under the Erdman act, arbitration under the Erdman act, mediation followed by arbitration under the Newlands act, and arbitration by voluntary agreement outside the statute. Which of these methods, if any, is a panacea for labor troubles on interstate railways? At the outset it may be asserted that the avoidance of labor conflicts is not the sole object or the ultimate goal of wage-regulating legislation, and that the absence of strikes is not a final index of the success of the laws which have been described. It is of course obvious, particularly when the transportation industry is under consideration, that the maintenance of normal operating conditions is an end greatly to be desired. From the standpoint of the general public, which can only occasionally be made to look below the surface, this appears to be the one and only object of all legislation relative to mediation and arbitration. Moreover, although it would be rash to assert that there will never be another railway strike of large proportions, the likelihood of such an outcome of any controversy is growing more and more remote. We have not had a railway strike of any magnitude for twenty years. It is true that the balance of power in the control of wage conditions has passed for the moment from the railways to organized railway labor. It is true that strike votes are always taken, and that these result in entrusting to the grand officers of the brotherhoods the power to call a strike at their discretion. But these polls are in most instances mere devices to strengthen the strategic bargaining power of the organizations. It is always the confident expectation of the grand officers that possession of the power will make its exercise unnecessary.

Prompt adjustment of the instant controversy was the service that the able mediators under the Erdman act, Judge Knapp and Dr. Neill, performed. They succeeded in nearly every mediation which they conducted in reaching an adjustment to which both sides were willing to agree, and today railway managers and employees are unanimous in commending the work of those public servants. They prevented labor conflicts, an outcome which satisfied the public, and they compromised the disputes with such a degree of success that, although neither side was satisfied, both were willing to abide by the result and the employees were contented to delay for a season a renewal of their attack upon the railway "wage fund."

The wisdom of so framing the statute as practically to designate two specific individuals as mediators became evident, as these gentlemen grew more and more familiar with the complex details of the wage schedule and were able to adjust controversies with increasing intelligence. It more than once happened that they were called in to pass on the merits of an existing schedule which they themselves had had a part in constructing. The element of permanence in the mediating body made possible the development of an expert proficiency in the work of adjustment. The weakness of the method was contained in its very nature. It was a mediation and not an arbitration. The function of the mediators was in no real sense to enter into the merits of the controversy.

This policy of seeking an adjustment rather than a judgment on the merits of the issue is well shown in the engineers' and firemen's case of this present year in western territory in which President Wilson intervened. When the employees presented their demands, the railways canceled existing schedules and made counter-demands. To these the employees vigorously objected, insisting that they would give up nothing that they had gained in their years of struggle, and refusing to consider any terms except those which they themselves had proposed. The federal mediators when called in, accepted the point of view of the employees, apparently because they found that there was no other way to avoid a strike. This "compromise" the employees promptly agreed to, contending that they had gone half way in accepting arbitration at all, since they had earlier asserted that they would never again resort to a method which had produced results so unsatisfactory to them. Hence the railways were put in the position before the public of declining the proposal of a federal mediation board which the employees had accepted. They had been out-maneuvered and their capitulation was inevitable even before they made their call at the White House.

It is worthy of note that in no instance has the original demand for a modification of existing schedules come from the railways. Railway managers have apparently felt it wiser to let well enough alone. They have preferred to cut down or readjust their working forces in times of light traffic rather than bring on a struggle by upsetting fundamental conditions. This is partly to be explained by the fact that during most of the period under consideration railways dealt separately with their own employees, and were in a weaker position strategically than now under the plan of concerted movements. Moreover, it is more than probable that increases in wages did not distress them so seriously in the days when the capacity of their plants left some leeway for expanding business, and when there was a more generous margin between income and outgo.

In view of the fact that controversies have always had their origin in a demand from the side of the employees, the verdict even though a compromise has always resulted in giving something to the men. Even if the railways' unwillingness to grant the demands has merit, there is no way of enforcing their claims. Playing a game in which the cards are stacked against them, they must acquiesce in the outcome, which usually whittles down but never rejects the demands of the employees.

As the size of the contesting forces has widened the gap between employer and employee, as the conflicts have become more serious, and as the increasing gravity of the railways' financial condition has made a wage increase a matter of genuine alarm, resort has been taken more commonly to the method of arbitration. This has meant the choice of one, or under the amended statute two, non-partisan arbitrators. Selection has been a task of the greatest difficulty. In almost no case have the representatives of the contestants been able to agree on the independent member or members of the board, and the burdensome duty has fallen on the government mediators.

SHORTCOMINGS OF THE ARBITRATORS

The independent arbitrator, like the juryman, must have no preconceptions. His affiliations with life must be untainted by contact with railways. If he has ever had experience in an arbitration, he is likely to have incurred the displeasure of one side or the other sufficiently to render him unacceptable. But it is obvious that while impartiality and diplomatic skill are necessary, ignorance of the questions at issue is not. A wage schedule is a complex affair and its complexity is growing with the tendency to lay greater stress on working conditions and less on rates of pay. In the conductors' and trainmen's case, for example, the board had to consider the demands of conductors, baggagemen, brakemen and flagmen in passenger, freight and yard service, in local and through service, in electric and steam service; and it had to pass upon questions such as length of the working day, overtime and how computed, compensation for deadheadings, for double-headed trains, and for holding men

away from their home terminals. The representatives of the two factions are experts chosen for their thorough knowledge of the issues and their skill in presenting them. The umpire enters the hearings usually with no acquaintance even with the elementary principles of railway wage schedules. He listens to the highly technical testimony of witnesses—employees and operating officials—and at the conclusion of the hearings he is set upon in conference by the other two so-called arbitrators. His superficial half-knowledge results in inconsistent rulings, and his lack of background leads him to the natural conclusion that there is merit in the contentions of both sides, and that justice lies somewhere between. The unsatisfactory verdict, frequently ambiguous and conflicting in its different provisions, gives opportunity for a further continuance of the struggle on the individual railways that have been parties to the concerted movement. These decisions of arbitration boards lay down no helpful precedents for future action, and have no general educational value. The situation is in no wise improved when two umpires take the place of one. What is needed in the independent arbitrators is not merely a high degree of mentality or diplomatic skill, or profound knowledge of the labor problem in general, but rather a thorough familiarity with conditions of railway labor.

But not alone in the actual awards have the decisions of the boards been unsatisfactory. In many cases the explanations of these decisions have been unimpressive, and the reasoning unacceptable. A careful reading of the decision in the conductors' and trainmen's case leaves one with a lurking suspicion, which it is difficult to dispel, that the board decided first on the amount of increase to be granted and later found a reason therefor. The engineers' board of 1912 discussed at some length the insoluble problem as to what is the basis of a fair wage. They were forced to the conclusion that the science of economics furnished no answer, and that they could only approximate an answer by comparing railway wages for similar service in other parts of the country and wages in other industries of like character.

It becomes clear then that a substitution of arbitration for mediation has lost to the country and to the contestants the expert service of trained mediators. Moreover, because of the method of selection, and the type of men chosen as intermediaries, the arbitration procedure has become largely a formality resulting in compromise verdicts, which as shown by the discussion have not been thus far as satisfactory to either side as were the agreements under the mediation process. We have not therefore obtained either from the mediation method or that of arbitration results of enduring value. Under the policy of mediation we have developed experts in the interpretation of railway wage schedules, but these experts have been debarred by the very nature of their office from considering issues on their merits. Under arbitration, the forms of a judicial hearing have been conscientiously observed, attempts have been made to weigh evidence and to reach just conclusions; but the men upon whom the burden of decision has fallen have not been experts. One of the important consequences of this is that the public, whose agents the independent arbitrators are supposed to be, has been at a disadvantage, and has not been adequately represented.

It must be clear that we need above all things else, for the handling of these great labor disputes, a group of independent persons who have become expert through permanence of tenure. It would be natural to expect that any permanent body of arbitrators would quickly become unacceptable to one side or the other or both. The long continued success of the mediators under the Erdman act was in large part due to the fact that they made no pretense of settling questions on their merits. A settlement after thorough investigation will not usually strike the middle point between the contesting sides. Again it is the fear of the employers that such a board would "get into politics" and of the employees that it would fall into the hands of the employing class.

If such a board of official arbitrators were created and the parties to the contest should refuse to invoke their services, ought they to be compelled to do so? Ought we to attempt to introduce compulsory arbitration? Such a proposal does not at the present time command serious attention. The enthusiasm for it in this country has perceptibly cooled in recent years.

IS COMPULSORY ARBITRATION DESIRABLE?

Compulsory arbitration has not realized its early promise in countries where it has been tried. One of the fairest and most sagacious students of the labor problem in the South Seas, Dr. Victor Clark, has reached the conclusion that compulsory arbitration has been successful only among unorganized laborers and that the powerful trade unions have not been prevented from striking when it has been to their interest to do so. Compulsory arbitration succeeded in the early years when the laborers were securing constant increases in their wages, but the ardor of the unions has cooled as the verdicts have become less favorable. It is of interest to note that even in decisions under compulsory arbitration the lure of the compromise is ever present.

As a matter of fact the situation is hopeless, and will remain so, as long as we delude ourselves into thinking that we can under present economic conditions find a basis for wages in any theory of ultimate reasonableness. It may be that we are not merely chasing a will-o-the-wisp when we are hunting for a reasonable wage, but we are at any rate seeking the unattainable. No more in the determination of a wage scale than in the determination of a railway rate is there an exact mathematical formula for reasonableness. So long as the two parties to the dispute are free to dicker undisturbed by outside influences, the conclusions reached will be the resultant of the bargaining skill and brute force of the contending factions; if arbitrators intervene guess-work and compromise will play their part. Moreover, we are dealing here with an industry in which an interruption of service quickly becomes intolerable. Consequently we cannot permit the contestants to settle their differences by employing the customary weapons of labor warfare. So we set up devices under the sanction of law as a substitute for force. As a rule and in the long run these arbitration boards will give to the men what they might if left undisturbed have secured by their own efforts. The public has gained peace but it has not reached any final solution of the wage problem.

No escape from the obstacles with which this question is beset will here be attempted, but it is submitted that the gravity of the situation will be much relieved, and the question far more intelligently handled, if provision is made for a compulsory investigation by non-partisan experts of the issues involved in any controversy, and for the proper presentation of the results. Specifically, the principle of the Canadian Industrial Disputes act should be adopted in this country. This act declares a lockout or a strike to be illegal until the matters in dispute have been investigated by a government board, and pending the investigation conditions are to remain as they were before the dispute arose. The investigating boards are temporary, appointed for the immediate controversy and discharged when their reports have been rendered. They consist of three members, one representing each side and a third chosen as umpire by the two; or, if the two fail to agree, by the minister of labor. However, these boards are not merely for investigation. In fact, their main purpose is to effect a conciliation and avoid a strike. Our experience with the railway labor situation as summarized in this discussion would lead us to expect that a board chosen in the Canadian fashion would not meet the requirements. While in Canada the same man has frequently served as chairman on different boards; there is no requirement that he shall do so. In this country, in the present temper of labor and capital, there is little likelihood that the same man would be acceptable for long. If a new man is chosen each time he lacks the necessary knowledge and experience.

THE NEED OF EXPERT INVESTIGATORS

Those responsible for the investigation and its results should be permanent government officials devoting their time exclusively

to this work. While an investigation is under way, they might very properly be assisted and checked by representatives of the two sides.

The call for expert investigators is so imperative as to require little argument. In the first place the merits of the immediate issues need to be studied by those who possess the necessary qualifications, and all the facts that would be helpful in creating an enlightened public opinion should be disclosed. Mediators and arbitrators, limited as they have been in time, and restricted to issues directly submitted, have in most cases confined themselves to the immediate wage contract. As a consequence one adjustment has been of little or no assistance for the next. It might well be one of the functions of such a body to make the public realize that a reasonable wage is impossible of attainment. We need much enlightenment on such fundamental issues as the relation of wages to cost of living, and to railway operating efficiency. Such questions as the following are demanding intelligent answers: Is there any logical relation between railway wages and railway output? between wages and the capacity and efficiency of the plant? For example, is there any proper connection between a trainman's wages and an increase in trainload? between an engineer's wages and an increase in tractive power? Again, have the risks and responsibilities of trainmen increased or decreased with the introduction of modern operating tools and methods? Is the working life of a trainman shorter than that of his fellow worker in similar industries outside? How does the railway employee's wage compare with that of workers in other highly skilled occupations? Are the brotherhoods receiving wages out of proportion to those of other classes of railway labor? Is there and should there be any relation between railway wages and railway revenue? Is the question of fair wages involved with the questions of fair interest and fair profits?

A group of permanent investigators would develop skill in weighing evidence, would build up a body of valuable precedent, would accumulate an experience that would be enriched constantly with the passing of years. For these labor struggles move in cycles, and the issues that investigators had passed upon would appear again in familiar form as the basis for later demands. Moreover, these men would acquire facility in the presentation of the results of their investigations in terms that the public could understand. It is essential, if public opinion is to be invoked in aid of settlements, that the issues shall be freed of all technicalities and stated in a manner to arouse public interest and stimulate public discussion. The difficulty of such a task is often underestimated.

The success of the investigators in settling disputes during the progress of the investigation would depend upon the personality of the government investigators and their skill in building up a reputation for impartiality. The tendency would of course be for them to become increasingly unpopular as time went on, for their conclusions concerning issues investigated, if of a character to command public confidence, would frequently strike hard at the contentions of one side or the other. But whether these investigators are to be permanently acceptable to the opposing factions is not after all the controlling consideration. These are public questions and it is the public that demands enlightenment.

As already noted, such a plan would forbid strikes or lockouts during the period of investigation. After the results were published, this restraint would be removed. But the likelihood of a labor outbreak following the publication of the results of an investigation would be remote. The very fact that the contestants would be compelled to delay their conflict would have a tendency to develop a spirit of compromise. This is of great psychological import in any impending quarrel. Again, the territory involved is so vast, the leaders of the labor organizations are so mindful of their great responsibilities, the railway managers are so sensitive to public opinion and so watchful of their earnings, that strikes in any event are not at all probable in the future in connection with this class of controversies. More-

over, the probability of a strike is very greatly lessened when the public has once become thoroughly informed on the issues and is prepared to take a hand.

As for the amendment of our existing statutes covering mediation and arbitration, this may, except in details, properly be left until the results of compulsory investigation have been appraised. It has been suggested that the Newlands act should not be confined to employees in train service, but should be extended to include all railway employees; and it has been proposed that there should be some sort of co-ordination between the board of mediation and conciliation and the Interstate Commerce Commission in the matter of increased wages and increased rates. It may be, as has many times been suggested, that the Interstate Commerce Commission will be obliged eventually to give more attention to operating expenses and to take over the regulation of railway wages. It is clear that the commission at present is not disposed to fall in with the suggestion usually made by arbitration boards, and raise rates to compensate for the increased wages that the boards have awarded. That these boards have taken a sound position in insisting that they have no concern with the ability of a road to pay has already been conceded in this discussion. But the fact remains that the margin of railway net revenue is growing constantly narrower, and that the railways are contemplating with much concern the steady increase in wages which they are unable to check and the hardening of rates which they are unable to disturb.

No final solution of so perplexing a problem as that of the relations of capital and labor is to be expected within the near future, even in the field of public service corporations, but we can begin at once to study the whole question in a thoroughgoing fashion and with the use of the most highly developed scientific methods, and thus lay the foundation for a larger participation of the public in the settlement of disputes in which its interest is so fundamental.

ELECTRIC INTERLOCKING AT AULON, TENN

An all-electric interlocking plant has recently been put in service at Aulon, Tenn., at the crossing of the Nashville-Memphis main line of the Nashville, Chattanooga & St. Louis with the Illinois Central's line leading to its new yard in South Memphis, and with the main line of the Louisville & Nashville, all of which are double tracked. The Union, a single track belt line railway, also crosses the L. & N. at this point. The tower is a two-story brick structure. The machine is of the G. R. S. unit-lever type, containing 88 spaces, having 53 working levers operating 61 functions. The power for the plant is furnished by the Memphis Consolidated Gas & Electric Company, at 220-volts, a. c., with a frequency of 60. For the electric lights, both in the tower and in the signals, and for one winding of the track relays, the current is transformed to 110 volts. The track circuits are alternating current, but for the mechanisms and control d. c. is used. Emergency power is supplied by Edison storage battery A-4-H type, consisting of 90 cells of 150 a. h. capacity. This is available for the operation of the interlocking machine and all switch and signal motors, as well as for lighting purposes.

The high signals are G. R. S., model 2-A, with top-post mechanism, mounted on iron posts, working in the upper quadrant. Home signals have three positions wherever there is another home signal in advance; otherwise, they operate in two positions. The home signals are semi-automatic, the 45 to 90 deg. positions being controlled by the track circuits, so that after a train enters a section the signal cannot be cleared by the leverman until the train passes the insulated joint at the end of the track circuit for that section. Distant signals are two-position, operating from 45 deg. to 90 deg., each distant signal being operated by a lever in the tower and also controlled by a circuit breaker on the home signal in advance. The dwarf signals are G. R. S., model 3, solenoid type, working in two po-

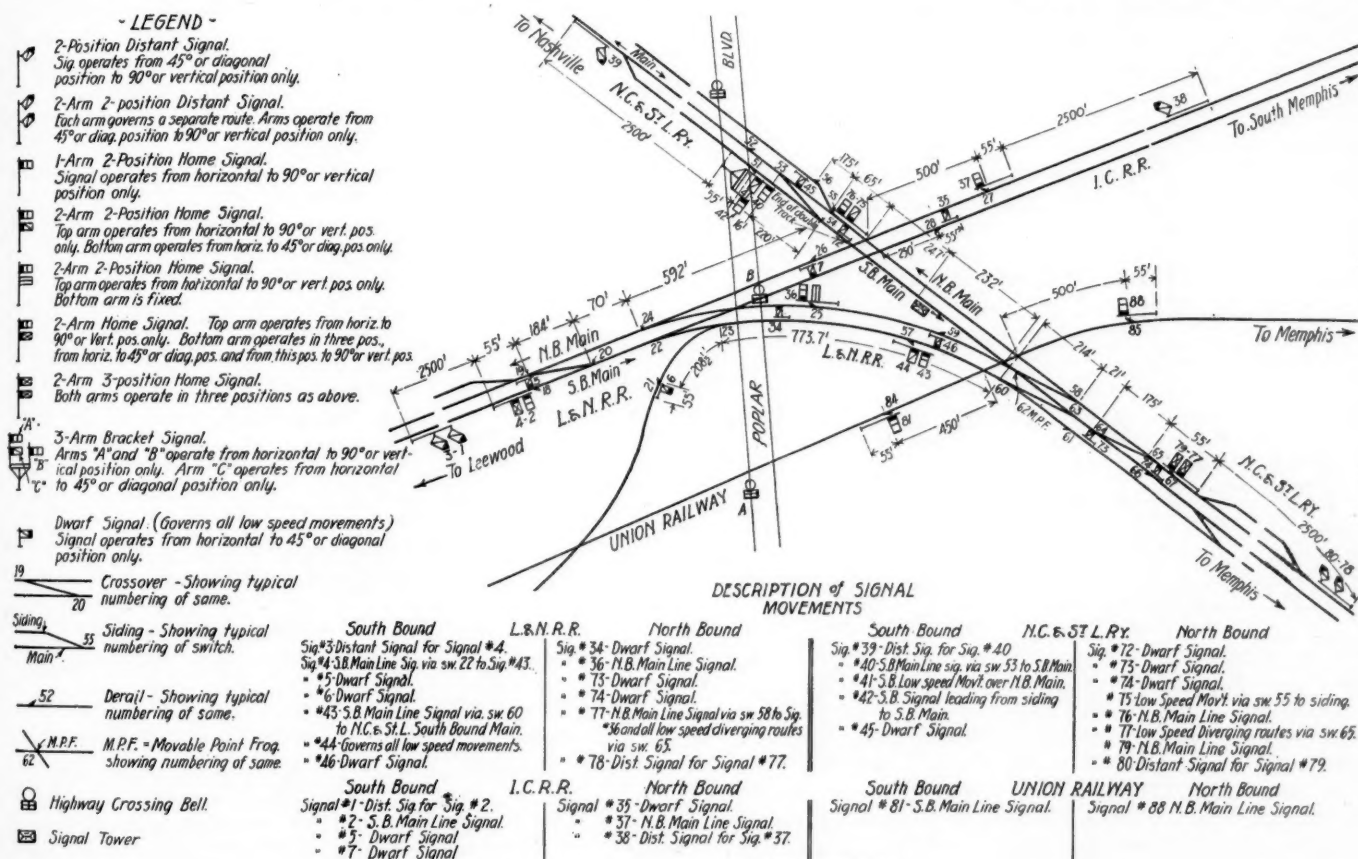
sitions, 0 to 45 deg., and are controlled entirely from the tower. On the top of the tower there is a low-voltage electric horn for giving signals to call the attention of switching crews, and also for calling the maintainer when he is needed. The night indications of signals are green for proceed, yellow for caution and red for stop. Derails on the high speed tracks are Morden lifting type and on low-speed tracks of the Hayes type. Both detector circuits and 53-ft. detector bars are used.

Poplar boulevard, which crosses all four railroads, is a street on which there is a dense traffic, many automobiles using it, especially at night. Realizing that the occupants of automobiles might frequently fail to hear the ringing of the ordinary crossing bell, and fail to note the approach of trains, a signal of the Brach type was installed—the "automatic flagman." This gives both a visible and an audible warning. It contains eight stationary electric lamps with red lenses showing on the street in both directions. These lamps are automatically lighted one after the

gine to move over the crossing; but since the signals go to stop automatically as soon as the leading end of a train passes them the control wire is looped in multiple through the back contacts of all the track relays in the circuit which include the sections of track crossed by the street; so that the bell continues to ring, through the track relay control, after the signal has gone to stop, and until the train has passed the crossing.

Previous to the installation of this plant, the numerous switches were operated by switchtenders and by trainmen, using hand signals. Six switchtenders were employed regularly, three of whom were operators. Switches were only lined up for through trains. Freight train and switching crews had to throw the switches themselves and also protect their trains by flags, when necessary.

The instructions for trainmen were formulated with special care and were accompanied by large scale charts prepared by the signal engineer of the Nashville, Chattanooga & St. Louis.



Descriptive Chart Prepared for Trainmen; Electric Interlocking at Aulon

other in a manner to give the effect of a swinging red lantern. Above the lights in large lettering, is the sign, "Railroad Crossing," and a large locomotive-type bell, which sounds as trains approach.

The unusual conditions under which the "automatic flagman" and bells were to operate were taken into consideration, and special circuits were designed to meet these conditions. As all the railroad lines cross Poplar boulevard, a proceed indication must be given by a home signal in every case before it is necessary for the automatic flagmen to start operating. The control circuits for the automatic flagmen were therefore looped in multiple through the circuit breakers on all of the home-signal levers which govern a route over the crossing. The contacts on the levers are normally open; that is, when the signals are at stop; and they are closed when the lever is changed to clear a signal. Thus the automatic flagmen would continue to operate only so long as there is a signal clear to permit a train or en-

This chart, which is illustrated, was posted on the bulletin boards of all the roads several weeks in advance.

The apparatus was furnished and installed by the General Railway Signal Company, under the supervision of G. S. Pfisterer, signal engineer of the Nashville, Chattanooga & St. Louis. The rubber covered wire, of which there is 160,000 ft., was furnished by the Kerite Insulated Wire & Cable Company, New York.

RAILWAY EXTENSION IN ITALIAN NORTH AFRICA.—The 20-mile railway from Azizia to the foot of the Garian mountains in Tripolitania was opened to public use on January 21, 1915. This is known as the Azizia-Henscir el Abeat division, and in addition to the terminal towns serves stations at Bir Cuca, Laim Aimirat and Cave. The two trains that formerly operated daily in each direction between Tripoli and Azizia, now run to Henscir el Abeat.

Reasons for Building the B. & O. Magnolia Cut-off*

Low Grade Double Track Line 12 Miles Long Costing
\$6,000,000 Relieves a Serious Operating Problem

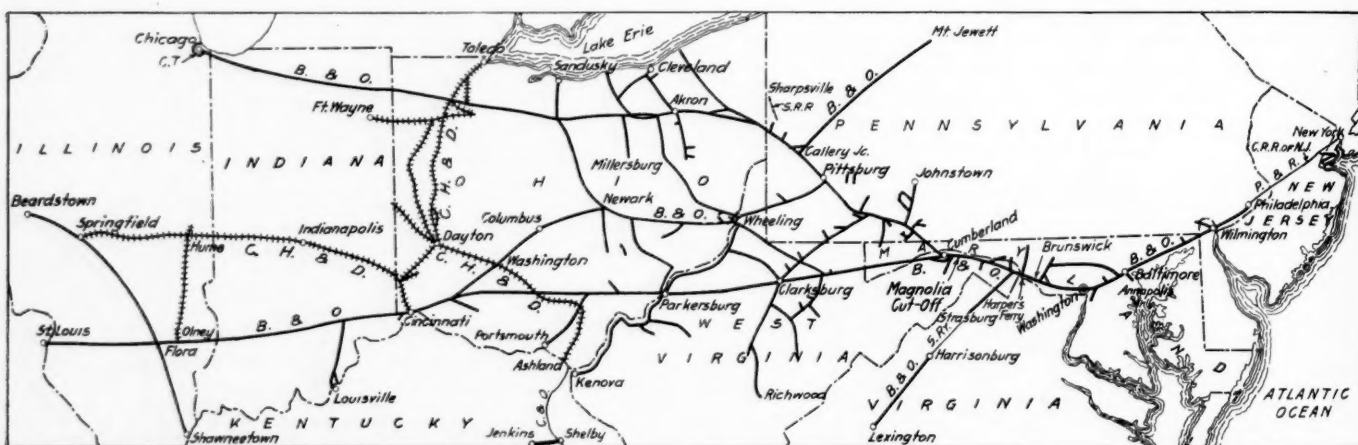
By A. W. THOMPSON

Third Vice-President, Baltimore & Ohio

During the period of 17 years in which the construction of the original line of the Baltimore & Ohio between Harper's Ferry, W. Va., and Cumberland, Md., was under consideration, many routes were surveyed on both sides of the Potomac river. On account of a lapse in the company's Virginia charter and a provision in the law extending the charter, that the route must lie in the state of Virginia, the company was forced to adopt a line south of the river. This location had other decided advantages, however, as it reached the fertile valleys bordering on the tributaries of the Potomac, avoided interference with the Chesapeake & Ohio canal then far advanced in its construction, and was cheaper than a line north of the river by \$2,625,000. The final location of this line was made in September, 1839, and the road opened to Cumberland in November, 1842. On account of the necessity for avoiding heavy construction work a line with heavier grade but shorter than the circuitous route following the river was adopted. The original line included three tunnels, all

branch, and ascending a 0.3 per cent grade to the foot of a 20 mile helper grade of 0.75 per cent at a point 8 miles west of Pinkerton on the Connellsville division. The estimates show that it would require approximately \$17,755,000 to construct a new line and revise the present one on such a basis. At the summit of the mountain the 1.23 per cent line through Sand Patch tunnel could be replaced by one commencing at Garrett, Pa., having a 0.3 per cent eastbound grade with a tunnel 13,500 ft. long. This revision would cost \$4,312,000. These new lines and revisions would permit operation on a 0.3 per cent basis from the Fairmont coal fields eastbound to the summit of the Allegheny mountains with a helper grade of 20 miles.

On the east side of the summit the grade is descending eastbound until the location of the recent Magnolia improvement is reached. At this point the completion of this work provides a 0.1 per cent eastbound grade to Cherry Run, where a 0.3 per cent helper grade has been established eastward to Hedgesville. From



Map of the Baltimore & Ohio System Showing Location of the "Neck" Between Cumberland and Brunswick in Which the Magnolia Cut-Off Improvement Is Located

of which have now been eliminated, the last being a part of the Magnolia cut-off improvement.

HANDLING COAL TO TIDEWATER

In January, 1844, the new road was offered a contract for hauling 175 tons of coal, pig iron and bar iron for 300 days in the year at a rate of $1\frac{1}{3}$ cents per ton mile. From this beginning the semi-bituminous coal trade on the Baltimore & Ohio has grown to 30,000,000 tons a year, the gross revenue from which is 0.4 cents per ton mile. If a new project were considered for handling this traffic from the Maryland, West Virginia and Pennsylvania fields to tidewater, undoubtedly a line with grades against eastbound traffic not exceeding 0.2 per cent could be built over these ridges with a tidewater terminal located at some point on the Potomac river.

During the growth of this business the question of more economical operation has been constantly studied and many surveys have been made covering various lines from the Fairmont, W. Va., region to tidewater. It has been found possible in these surveys to establish an eastbound low grade line beginning at Van Voorhis on the Fairmont, Morgantown & Pittsburgh

Hedgesville to Harper's Ferry surveys have been completed which show that for \$3,500,000 a low grade line can be constructed, having a maximum eastbound grade of 0.1 per cent. These surveys have been made looking toward the future when it is thought the eastbound tonnage will have grown to such proportions that more economical operation will be necessary and the large expenditures will be justified.

EAST END OF CUMBERLAND DIVISION

The congestion on the 102-mile freight division between Cumberland and Brunswick was serious as early as 1900, and various improvements were considered, including the Magnolia cut-off. Owing principally to the heavy expenditures necessary to add to the track facilities along the Potomac river, however, they were postponed from time to time. At Cumberland, two double-track lines, one from Pittsburgh and Chicago, and the other from Cincinnati and St. Louis, meet and form the main line east. At Patterson Creek, 8.1 miles east of Cumberland, a freight cut-off joins the main line from the Cincinnati-St. Louis line, which eliminates handling this freight through Cumberland. These two double-track lines merge into a three-track road from Patterson Creek to Little Cacapon, 13.9 miles, at which point there is a westbound passing siding. From the latter point to Magnolia, 7.5 miles, there are but two tracks with a westbound siding

*Abstracted from a paper presented before the Engineers' Society of Western Pennsylvania, November 24, and published in the December, 1914, Proceedings. A description of the interesting construction features of this important work was published in the *Railway Age Gazette* of July 17, 1914.

at Magnolia. An additional freight running track is provided from Magnolia to Hansrote, 9.5 miles, at the foot of the helper grade. From Hansrote to Orleans Road, 4.7 miles, there are two tracks on an 0.8 per cent grade, eastbound, against the

follows: 14 per cent fast freight, 84 per cent slow freight, 2 per cent package local. The average daily movement on the east end of the Cumberland division for a 10-day period, ending March 10, 1914, is shown in the following table:

AVERAGE DAILY MOVEMENT—EAST END CUMBERLAND DIVISION
For Period 10 Days Ended March 10, 1914

| East | Miles | Passenger trains | Fast freight trains | Slow freight trains | Total | Loads | Empties | Total | Gross tons per mile of road | Tons per train | Ratio |
|--|-------|---------------------|---------------------------|---------------------------|-------|-------|---------|-------|-----------------------------------|-------------------|-------|
| Keyser to Patterson Creek..... | 20.2 | 6.4 | .3 | 9.0 | 9.3 | 561 | 3 | 564 | 37,920 | 4,477 | 43.1 |
| Cumberland to Patterson Creek..... | 8.1 | 13.4 | 5.8 | 11.6 | 17.4 | 929 | 32 | 961 | 48,797 | 2,804 | 55.4 |
| Patterson Creek to Cherry Run..... | 57.1 | 13.4 | 6.1 | 20.7 | 26.8 | 1,506 | 38 | 1,544 | 88,048 | 3,285 | 100.0 |
| Cherry Run to Cumbo..... | 10.8 | 13.4 | 6.1 | 20.6 | 26.7 | 1,359 | 31 | 1,390 | 78,590 | 2,943 | 89.3 |
| Cumbo to Brunswick..... | 26.4 | 13.4 | 5.7 | 12.6 | 18.3 | 922 | 30 | 952 | 50,387 | 2,761 | 57.2 |
| West | | | | | | | | | | | |
| Brunswick to Cumbo..... | 26.4 | 16.2 | 4.3 | 13.9 | 18.2 | 266 | 744 | 1,010 | 24,563 | 1,349 | 60.0 |
| Cumbo to Cherry Run..... | 10.8 | 16.2 | 5.3 | 20.3 | 25.6 | 331 | 1,103 | 1,434 | 35,459 | 1,385 | 86.7 |
| Cherry Run to Patterson Creek..... | 57.1 | 16.2 | 5.3 | 21.7 | 27.0 | 387 | 1,237 | 1,624 | 40,907 | 1,515 | 100.0 |
| Patterson Creek to Cumberland..... | 8.1 | 16.2 | 3.5 | 11.7 | 15.2 | 250 | 537 | 787 | 21,819 | 1,435 | 53.3 |
| Patterson Creek to Keyser..... | 20.2 | 6.2 | 1.8 | 9.6 | 11.4 | 116 | 648 | 763 | 16,980 | 1,489 | 41.5 |
| Patterson Creek & Cherry R.—E.&W. .... | .... | .... | 11.4 | 42.4 | 53.8 | 1,893 | 1,275 | 3,168 | 128,955 | 2,396 | .... |

ruling movement from Hansrote to the summit at Doe Gully tunnel. From Orleans Road to Cherry Run, 25.3 miles, there are three tracks with a four-track section from Sir John's Run to Hancock, 5.1 miles. At Cherry Run the main line which is double track, ascends an 0.8 per cent grade for a distance of 7 miles to the summit at North Mountain. From Cherry Run to Cumbo there is a low-grade, eastbound double-track freight line, 14 miles long, which passes around North Mountain and joins the main line again at the latter point. From Cumbo to Fawver, 3 miles, there is a double-track line and from Fawver to Opequon, the foot of a helper grade, there are three tracks, the third being the eastbound running track, and an 0.8 per cent ascending grade begins at Opequon, which continues to the summit at Hobbs, 7.3 miles. From this point to Engles, near Harper's Ferry, 5.8 miles, there is a double-track line with an 0.8 per cent descending grade and a westbound third track. From Engles to Weverton, 6.2 miles, there is a double-track line. Brunswick yard, the east end of the freight division, is situated just east of Weverton.

The division is operated for a general grade of 0.3 per cent, eastbound, using helper engines over the two 0.8 per cent grades. With the completion of the Magnolia cut-off, helper engines at Hansrote will be eliminated, which will permit a continuous movement of freight trains between Cumberland and Martinsburg, the part of the road of greatest traffic density. From Martinsburg east over the third summit, the use of helper engines will be continued until the low-grade line between Martinsburg and Harper's Ferry will have been built. The elimination of the 2½-mile helper grade at Hansrote was delayed on account of the very rough country and the circuitous route of the river, pending a decision in regard to a general change which would shorten the line and reduce the curvature in addition to eliminating the helper grade.

THE TRAFFIC AND RESULTING CONGESTION

A diversified business is handled over this line, the preponderance of which is soft coal. There are three points of interchange with other roads, at Cumberland with the Pennsylvania, the Cumberland & Pennsylvania, the Georges Creek & Cumberland and the Western Maryland, at Cherry Run with the Western Maryland, and at Martinsburg with the Cumberland Valley. At the latter two points, 47 and 71 miles respectively east of Patterson Creek, 43 per cent of the eastbound freight leaves the B. & O. for eastern Pennsylvania and New England delivery, coal being the principal commodity diverted. The Cumberland Valley is also the route of the Central States Despatch.

The greatest density of traffic on the B. & O. system, that is, the number of trains handled as well as the ton miles per mile of road, obtains between Patterson Creek and Martinsburg. There have been handled annually 20,000,000 net tons of freight per mile of road between these points and an average of 15,000,000 net tons per mile of road over the entire freight division between Cumberland and Brunswick. This traffic is divided as

As shown in the table, the heaviest tonnage is handled between Patterson Creek and Cherry Run, the number of trains being approximately the same in each direction. The eastbound gross tonnage amounted to 68.1 per cent of the total, consisting of 97.5 per cent loaded, and 2.5 per cent empty cars, while the westbound freight movement comprised 23.8 per cent loaded and 76.2 per cent empty cars. Of the total cars operated, 97 per cent carried full rated tonnage, which is a very high average. The highest average miles per car per day for the system obtains on this division for two reasons, first, because of the through movement and the large number of cars handled and second, because of the small amount of business originating in this territory.

The most serious congestion in handling this heavy traffic was, of course, on the helper grade between Hansrote and the summit at Doe Gully tunnel. Six or seven eastbound freight trains were always in the vicinity of this helper grade, either moving or waiting for track and on account of the helper engines having to use the westbound track down the grade, the westbound traffic was frequently delayed and the delay to helper engines, in turn, delayed eastbound trains.

IMPROVEMENT IN OPERATION 1910-1914

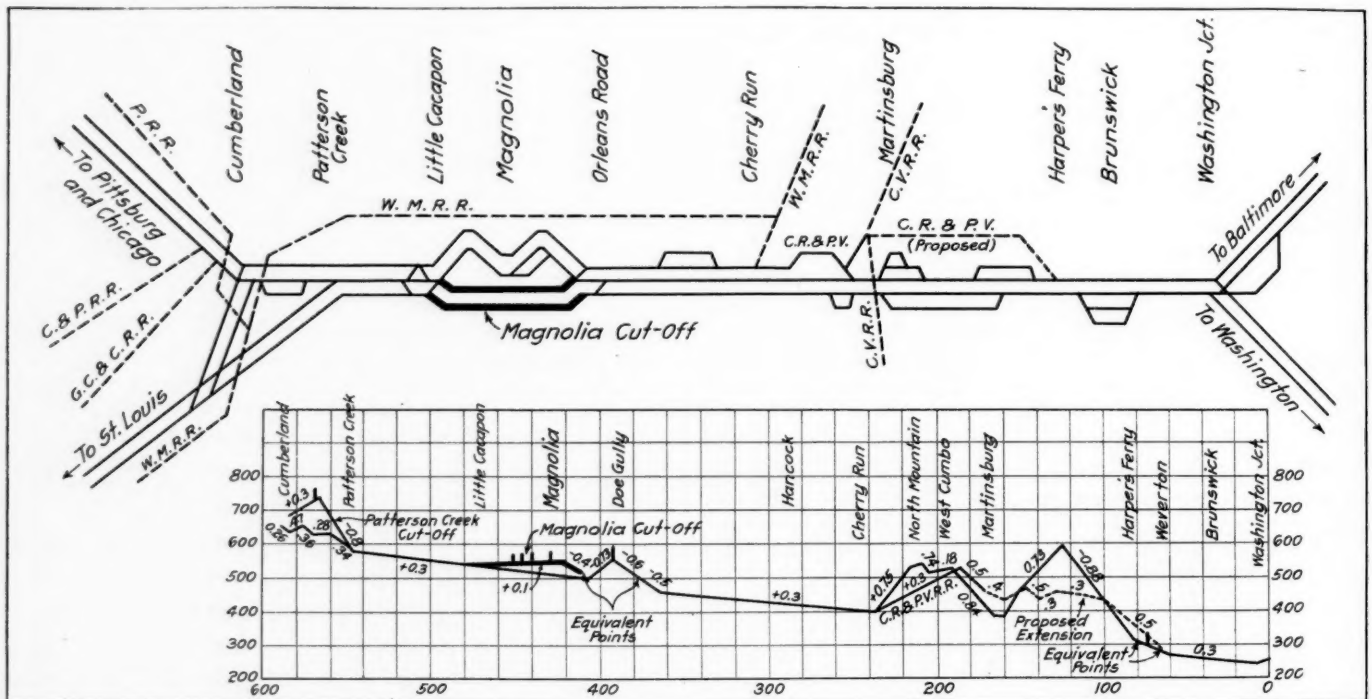
The congestion in this portion of the line, referred to as the "neck of the bottle," became so serious in the latter part of 1910 that conditions were given particular study with a view to taking care of the business offered at that time, as well as to provide for increased business. Had a revision of grade and line been worked out and decided upon at that time, and the money appropriated, the completion of the work could not have been accomplished in time to take care of the business offered, as it would have required at least 18 months to two years to complete any scheme presented for the Magnolia cut-off, and from four to six months to get any relief whatever from third track along other portions of the division. It was therefore necessary to do something at once and existing financial conditions demanded exceptional care in making expenditures.

In order to secure immediate results it was decided to order Mikado locomotives for immediate delivery, to construct additional automatic signals, and build third tracks where they could be laid on that portion of the line not affected by the proposed Magnolia cut-off, establish signal indications for the operation of trains, and provide more and better supervision. The Mikado locomotives ordered for this division weigh 284,500 lb., and have 55,000 lb. tractive power with 26.2 per cent greater hauling capacity than the consolidation locomotives previously used. A vigorous campaign was also started for a better carload, a decrease in the number of cars hauled, and an increase in the number of revenue tons per train.

The various passing sidings and freight tracks both east and west of the 17-mile section of road which was to be improved by the Magnolia cut-off, were coupled and extended, thereby securing maximum freight running trackage for a considerable

distance at each end of the proposed improvement. Interlocking towers were placed five miles apart and crossovers constructed between tracks to permit of parallel movements. In this three-track layout, the middle track was equipped with automatic signals to permit movements in both directions and the operation of all trains in this district was placed under signal indication, eliminating train order movements, the third-track system particularly lending itself to increased efficiency because of its flexibility in permitting almost four-track operation. No 16 frogs were installed in crossovers, which, when used, were covered by upper-quadrant, low-speed signal blades. A main-track coaling tipple, ash pits and water facilities were placed at Sir John's Run, half way on the freight run east from Cumberland, which resulted in a reduction in the cost of operation. Additional supervision was secured by placing well-trained men both on the road and in the superintendent's office. Particular attention was given to following the makeup of trains to reduce the num-

| | | | | | | | | | | | | | |
|--|---|---------------|-------------|------|-----------|-------------|---|------------|--------|---------|--------|-------|------|
| Gross ton miles | 3,976,266,271 | 4,460,587,008 | 484,320,737 | 12.2 | | | | | | | | | |
| Pass. car miles per locomotive | 34,500 | 31,870 | 2,630 | 7.6 | | | | | | | | | |
| Pass. car mi. per mi. main track | 18,630 | 19,540 | 910 | 4.9 | | | | | | | | | |
| Net ton miles | 1,997,887,181 | 2,316,743,150 | 318,855,969 | 16.0 | | | | | | | | | |
| Revenue train miles | 2,826,043 | 2,165,716 | 660,327 | 23.4 | | | | | | | | | |
| Freight engine miles | 3,117,261 | 2,318,263 | 798,998 | 25.6 | | | | | | | | | |
| Loaded freight car miles | 68,539,339 | 69,990,517 | 1,451,178 | 2.1 | | | | | | | | | |
| Empty freight car miles | 39,899,356 | 43,752,856 | 3,853,500 | 9.7 | | | | | | | | | |
| Total car miles | 108,438,695 | 113,743,373 | 5,304,678 | 4.9 | | | | | | | | | |
| Percent loaded to total | 63.18 | 61.53 | 1.65 | 2.6 | | | | | | | | | |
| Type of freight locomotives.. | <table><tr><td rowspan="3">{</td><td>Saturated</td><td>Superheater</td><td rowspan="3">{</td></tr><tr><td>Hand-fired</td><td>Stoker</td></tr><tr><td>Consol.</td><td>Mikado</td></tr></table> | | | { | Saturated | Superheater | { | Hand-fired | Stoker | Consol. | Mikado | | |
| { | Saturated | Superheater | { | | | | | | | | | | |
| | Hand-fired | Stoker | | | | | | | | | | | |
| | Consol. | Mikado | | | | | | | | | | | |
| Avg. number of freight locos. | 72.9 | 84.1 | 11.2 | 15.4 | | | | | | | | | |
| Trac. power of freight locos. | 3,054,510 | 4,448,890 | 1,394,380 | 45.6 | | | | | | | | | |
| Avg. trac. power per frt. loco. | 41,875 | 52,831 | 10,956 | 26.2 | | | | | | | | | |
| Avg. mileage per frt. loco... | 42,800 | 27,600 | 15,200 | 35.5 | | | | | | | | | |
| Gross ton mi. per mi. of road | 33,970,000 | 38,130,000 | 4,160,000 | 12.2 | | | | | | | | | |
| Gross ton miles per mile of main track | 11,540,000 | 12,080,000 | 540,000 | 4.7 | | | | | | | | | |
| Gross ton miles per frt. loco. | 54,650,000 | 53,000,000 | 1,650,000 | 3.0 | | | | | | | | | |
| Gross ton miles per 1,000 lb. tractive power | 1,302,000 | 1,003,000 | 299,000 | 23.0 | | | | | | | | | |
| Train load—Gross | 1,408 | 2,060 | 652 | 46.3 | | | | | | | | | |



Track Diagram and Profile of the East End of the Cumberland Division Showing Location of the Magnolia Cut-off and Proposed Improvements Between Cumbo and Harper's Ferry

ber of breaks-in-two to a minimum, and further to see that each train was given its full tonnage rating. Inspectors were also placed in the coal region to see that each car was loaded to its capacity.

During the four years 1910-14 the average carload on this division increased 13.4 per cent, the increase in average capacity of system cars during the same period being 5 tons, or 13.5 per cent. As an indication of the results secured by these measures the following table shows a comparison of operating statistics for this division between the fiscal years 1910 and 1914, indicating a considerably increased volume of business and a marked increase in efficiency:

| Description | Fiscal years | | Increase or decrease | Per cent |
|----------------------------------|---------------|---------------|----------------------|----------|
| | 1910 | 1914 | | |
| Miles of road | 117.00 | 117.00 | | |
| Miles of main track | 344.47 | 369.73 | 25.26 | 7.3 |
| Miles main track and sidings | 468.07 | 504.27 | 36.20 | 7.7 |
| Passenger train miles | 778,198 | 997,152 | 218,954 | 28.1 |
| Passenger car miles | 6,413,969 | 7,227,397 | 813,428 | 12.7 |
| Avg. trac. power per pass. loco. | Light Pacific | Heavy Pacific | | |
| Avg. mileage per pass. loco. | 15.5 | 18.9 | 3.4 | 21.9 |
| Cars per train | 456,625 | 760,060 | 303,435 | 66.5 |
| Type of passenger locomotive | 29,500 | 40,200 | 10,700 | 36.3 |
| Avg. number of pass. locos. | 4,310 | 4,475 | 165 | 3.8 |
| Tractive power of pass. locos. | 8.25 | 7.25 | 1.00 | 12.1 |
| Pass. car miles per mi. of road | 54,800 | 61,800 | 7,000 | 12.8 |

| | | | | |
|-------------------|-------|-------|-----|------|
| Train load—Net | 707 | 1,070 | 363 | 51.3 |
| Engine load—Gross | 1,276 | 1,927 | 651 | 51.0 |
| Engine load—Net | 641 | 1,000 | 359 | 56.0 |
| Car load—Net | 29.2 | 33.1 | 3.9 | 13.4 |

In the four years ended June 30, 1914, the revenue train load increased 51.3 per cent with a decrease in the freight train mileage of 23.4 per cent. The following table shows the decrease in number of trains run in that period and the increase in the net ton mileage:

COMPARISONS OF CAR AND TON MILES

| | |
|--------------------------------------|---------------|
| Number of freight trains run in 1910 | 36,082 |
| Number of freight trains run in 1914 | 28,527 |
| Decrease | 7,555 |
| Per cent decrease | 20.0 |
| Total freight car miles in 1910 | 108,438,695 |
| Total freight car miles in 1914 | 113,743,373 |
| Increase | 5,304,678 |
| Per cent increase | 4.9 |
| Net ton miles in 1910 | 1,997,887,181 |
| Net ton miles in 1914 | 2,316,743,150 |
| Increase | 318,855,969 |
| Per cent increase | 16.0 |

A comparison of the freight movements in this territory for 1914 and 1910 is shown in the table on the following page.

COMPARISON OF FREIGHT MOVEMENTS

| | | Per cent | | | | Per cent | | | |
|--------------------|-----------|----------|------|---------|---------|----------|------|--|--|
| | | | Inc. | | | | Inc. | | |
| | | Trains | Dec. | Loads | Empties | Total | Dec. | | |
| Keyser, East |1910 | 4,749 | ... | 207,207 | 1,470 | 208,677 | ... | | |
| Keyser, East |1914 | 3,964 | 16.5 | 246,414 | 4,638 | 251,052 | 20.2 | | |
| Cumberland, East |1910 | 8,795 | ... | 344,744 | 4,194 | 348,938 | ... | | |
| Cumberland, East |1914 | 5,450 | 38.0 | 333,034 | 12,459 | 345,494 | 1.0 | | |
| PATTERSON CRK., E. | 1910 | 13,544 | ... | 551,951 | 5,664 | 557,615 | ... | | |
| PATTERSON CRK., E. | 1914 | 9,414 | 30.5 | 579,448 | 17,097 | 596,545 | 6.9 | | |
| Brunswick, West |1910 | 9,039 | ... | 118,219 | 233,956 | 352,175 | ... | | |
| Brunswick, West |1914 | 6,307 | 30.2 | 107,546 | 266,770 | 374,316 | 6.3 | | |
| Martinsburg, West |1910 | 3,412 | ... | 28,160 | 138,095 | 166,255 | ... | | |
| Martinsburg, West |1914 | 2,406 | 29.4 | 35,742 | 154,743 | 190,485 | 14.6 | | |

These improvements in operation made it possible to take care of a rapidly increasing business, postpone for three years the construction of the Magnolia improvement, thereby saving the interest on a large sum of money that would otherwise have been expended immediately, and to provide additional time for studies of the contemplated line revision.

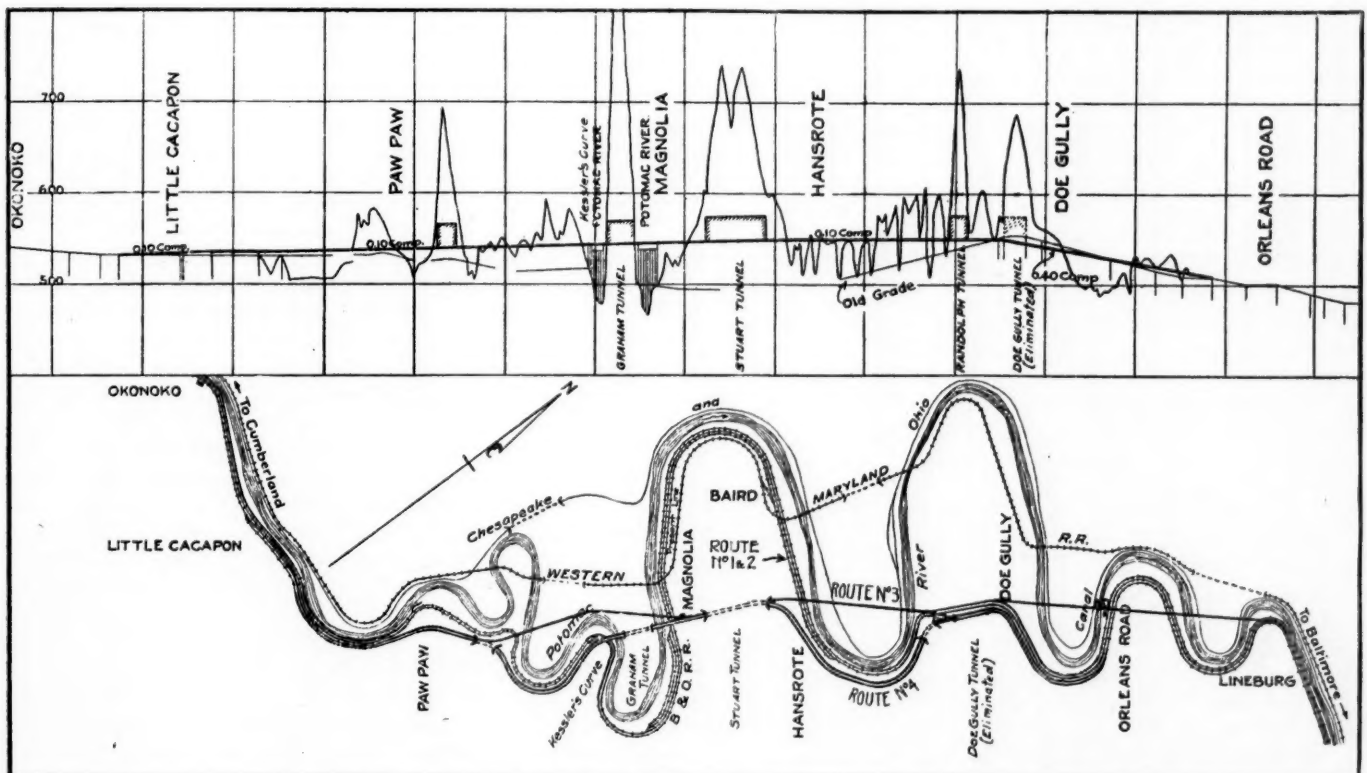
CHANGES IN LINE AND GRADE

The various studies that have been made as to improvements in the operation of the east end of the Cumberland division have shown that it is possible to obtain grades of 0.1 per cent or 0.2

Before the adopted line of the Magnolia cut-off was located and construction commenced, the studies included locations of both 0.1 per cent and 0.2 per cent lines, as it would be possible to obtain either of these grades on the Cumbo-Harper's Ferry lines. The present 0.3 per cent grade line from Cherry Run to Cumbo will have to be operated with a light helping engine on either 0.1 per cent or 0.2 per cent grades. The completion of the Cumbo-Harper's Ferry lines and the Magnolia cut-off would leave very little additional grade reduction necessary to obtain a 0.1 per cent grade against eastbound movement and a 0.15 per cent grade against westbound traffic, especially if it is considered necessary to revise on that basis only one track for slow freight in each direction.

CONSIDERATIONS IN LOCATING MAGNOLIA CUT-OFF

In taking up the study of the Magnolia cut-off improvement, an investigation covering several years was made of the train movement and tonnage handled, motive power, probable future locomotive tractive power and train loads. The relation of loaded eastbound movement to empty westbound movement being also carefully studied. It was finally decided that an eastbound grade of 0.1 per cent was possible, which would permit the most economical operation, and that a westbound 0.4 per cent



Location of Four Routes Considered for the Magnolia Improvement and Profile of the Adopted Line

per cent against eastbound traffic which is the loaded and ruling movement, and of 0.15 per cent against westbound traffic with 0.4 per cent helper grades on certain sections. The various studies pointed clearly to the fact that a 0.1 per cent grade is justified as compared with either a 0.2 per cent grade or the present method of operation. This grade would permit a maximum eastbound train load, based on the most economical operation, and the maintenance of a proper balance of power between eastbound and westbound movements. The general proposition to obtain better gradients over the entire division will necessitate the building of a low grade line along the river from Cumbo yard to Harper's Ferry, in addition to the Magnolia cut-off. The former line has been investigated and the recommendation made that any future construction of additional tracks between North Mountain and Harper's Ferry should be along this route.

grade would take care of the balance of traffic in that direction.

The question as to the construction of a new two or four-track line was also given a great amount of study. Four possible propositions were considered; first, a temporary third track alone, the present line retaining the eastbound helper grade; second, two additional tracks along the present line, retaining the helper grade; third, a four-track low grade cut-off abandoning the present line; and, fourth, a two-track eastbound low grade cut-off using the present line for westbound movements. Before the final decision was reached a total of 29 propositions covering various grades and alignments were covered, following practically three routes. These various studies included plans for building the new line in parts over a term of years, and the estimated cost of the lines varied from \$1,425,000 to \$15,575,000. The following table shows the estimated cost of a few of these

lines; also the annual operating costs, with and without interest, for the present traffic and for double that traffic:

operating standpoint that the new line can be better operated by using both new tracks for eastbound freight trains and the pres-

SUMMARY OF COST OF CONSTRUCTION AND OPERATION OF THE DIFFERENT LINES

| Line | Cost of new construction | Number of trains | | | |
|---------------------------------------|--------------------------|--------------------------|---|--------------------------|---|
| | | Present | | Double | |
| | | Annual cost of operation | Annual cost of operation including interest | Annual cost of operation | Annual cost of operation including interest |
| <i>Present Line and Grade:</i> | | | | | |
| No. 1—Three tracks throughout..... | \$2,235,000 | \$615,087 | \$726,837 | ..... | ..... |
| No. 2—Four tracks throughout..... | 3,375,000 | 615,087 | 783,837 | \$1,230,174 | \$1,398,924 |
| 0.1 per cent E.B. — 0.3 per cent W.B. | | | | | |
| No. 3—Four tracks throughout..... | 15,575,000 | 258,724 | 1,037,474 | 517,448 | 1,296,198 |
| 0.1 per cent E.B. — 0.4 per cent W.B. | | | | | |
| No. 4—Two tracks throughout*..... | 6,000,000 | 284,580 | 584,580 | 569,160 | 869,160 |

*Two new tracks with present line will make four track line.

The following table shows the saving in distance and curvature for the four principal routes considered:

| Line | Eastbound | | | | Westbound | | | |
|---------|-------------|--------------|----------------|-------------|-------------|--------------|----------------|-------------|
| | Dist. Miles | Saving Miles | Curvature Deg. | Saving Deg. | Dist. Miles | Saving Miles | Curvature Deg. | Saving Deg. |
| No. 1.. | 20.8 | ... | 2,130 | ..... | 20.8 | ... | 2,130 | ..... |
| No. 2.. | 20.8 | ... | 2,130 | ..... | 20.8 | ... | 2,130 | ..... |
| No. 3.. | 12.5 | 8.3 | 495 | 1,635 | 12.1 | 8.7 | 305 | 1,825 |
| No. 4.. | 15.2 | 5.6 | 1,380 | 750 | 20.8 | ... | 2,130 | ..... |

IMPROVEMENTS EFFECTED BY CUT-OFF

The recommended line No. 4, which was finally adopted and built at an estimated cost of \$6,000,000, is a double track line, using the present operated tracks for westbound traffic. This has made it possible to secure a four-track line and derive the benefit from a low grade with the least expenditure. Furthermore, it is believed that the following important characteristics have been secured. First, a minimum grade both eastbound and westbound which will permit the most economical operation; second, a 0.1 per cent grade eastbound, possible over the entire freight division, which will fit in with a general grade revision scheme from the coal fields to tide water; third, a 0.4 per cent grade for westbound business which is practically justified by the probable balance of future traffic; fourth, a four-track system between Little Cacapon and Orleans Road, which will take care of a largely increased volume of business and probably take care of the traffic over the division for a great many years. This section is the first portion of a four-track system, which will gradually be extended from Patterson Creek to Brunswick, a distance of 95 miles.

The Magnolia cut-off was more essential to the development of the Baltimore & Ohio as a system than is shown by the advantages to be gained by economies in operation. In view, however, of the heavy expenditure necessary to provide the additional tracks for the purpose of eliminating congestion that has heretofore existed in the handling of traffic over the east end of the Cumberland division, particularly this 17-mile section, it is reasonable to expect a reduction in the operating costs. Some of the direct savings that may be expected are as follows:

| | |
|--|-----------|
| Elimination of Hansrote Helping Station— | |
| Operation of helping engines..... | \$35,000 |
| Water station facilities..... | 2,000 |
| Interlocking tower..... | 3,000 |
| | \$40,000 |
| Overtime account of facilitated movement..... | 20,000 |
| Train mileage, increased tonnage, wages, fuel and supplies, including proportion of locomotives and car repairs... | 125,000 |
| Less mileage allowance to crews..... | 20,000 |
| Total direct saving per annum..... | \$205,000 |
| Total direct saving per month..... | 17,080 |

The flexibility in operation brought about by the elimination of the cause of congestion will result in a saving equivalent to the cost of operating eight road and two helper engines. It also will avoid bad situations beyond the improved section which will be beneficial in the coal regions where the traffic is assembled, as well as at points of destination, especially tidewater, permitting a quicker movement of traffic over the entire system. Conservatively estimated on the basis of the present business this saving should amount to approximately \$500,000 a year.

While it has not been definitely decided, it seems from an

ent main tracks and third track for east and westbound passenger trains and all westbound freight trains. Although the line is shorter by the new route, this advantage from the standpoint of passenger traffic is offset by the old line having no tunnels and being along the Potomac river for the entire distance. Facilities for handling passenger traffic will, however, be greatly improved by the elimination of the helper stations and the removal of the eastbound fast and slow freight trains from the old line.

WESTERN RATE ADVANCE HEARING

Testimony of the representatives of shippers and of the western state railway commissioners against the proposed advances in freight rates on fresh meats and packinghouse products occupied the hearing before Commissioner Daniels at Chicago this week in the western rate advance case. This is to be followed by testimony on the livestock rates from May 1 to May 5. Testimony on the advances on fruit and vegetable rates and on rice and rice products was heard on April 22, 23 and 24. The testimony on grain and grain products was not completed in the time allotted for it in the schedule on April 21, although several night sessions have been held, and supplemental testimony will be presented on the days allotted for unfinished evidence at the end of the hearing.

One of the witnesses for the shippers of grain and grain products was W. J. Thompson of the United States Department of Agriculture, who introduced exhibits to prove that the farming industry is unprofitable and in too weak a condition to stand the proposed advance of one cent per 100 lb. in the grain rates. He presented figures based upon returns from 273 farms to show that the net return only averaged 3½ per cent on the value of the property used. Under cross-examination by T. J. Norton, general attorney of the Atchison, Topeka & Santa Fe, Mr. Thompson said that he had not taken into consideration the fact that the farmer gets a living for himself and his family, and that he had not included money the farmers receive for butter, eggs and other similar products. Mr. Norton entered objection to the entire testimony as being irrelevant. Commissioner Daniels ruled that the question of whether the shipper was making a profit or a loss had nothing to do with the reasonableness of a freight rate, but said that since the question of returns had been raised he would admit the testimony for what it was worth, although he was not strongly persuaded, he said, that the average farmer keeps cost accounts.

C. W. Hillman and Jean Paul Muller testified as expert accountants for the shippers and the state commissions as to the cost of handling grain traffic. Mr. Hillman presented an extended analysis of the operating revenues and expenses of the Chicago & North Western to show the margin between the cost of moving grain and the revenue received by the railroad per car for the month of November, 1914. He divided the operating revenues and operating expenses of the road between freight and passenger service, and then attempted to separate the expenses of handling the wheat, other grain and grain products traffic. The result was to show that the cost of carrying a car of wheat into Chicago from Sioux City, Iowa, 526 miles,

was \$29.41; from Council Bluffs, Iowa, 470 miles, \$26.53, and from South Omaha, 478 miles, \$26.84. On other grain his figures were \$28.44, \$25.81 and \$26.33, respectively, and on grain products \$25.16, \$23.53 and \$23.91, while he figured the cost from the average station, 399 miles, as \$27.26 on wheat, \$25.74 on other grain and \$24.72 on grain products. The average earning per car, he said, as shown by waybills covering the movement of 33 cars of wheat from 25 typical stations in Minnesota, Nebraska and South Dakota, was \$108.29 for an average haul of 406 miles. On other grain, 947 cars, with an average haul of 444 miles, the average earnings per car were \$116.13; and 546 cars of grain products traveling an average distance of 438 miles, yielded an average revenue per car of \$42.76.

Mr. Muller, who appeared for the National Council of the Farmers' Co-operative Grain Dealers' Association, testified that grain traffic is a more profitable tonnage than the average of all freight traffic, basing his conclusion upon an analysis of the operating revenues and expenses of the Chicago, Rock Island & Pacific; Atchison, Topeka & Santa Fe; Chicago, Burlington & Quincy and Chicago, Milwaukee & St. Paul. On the Rock Island, he said, 21.27 per cent of the total operating expenses could be charged directly to the freight and passenger accounts without the necessity of any allocation. By various methods he charged 67.22 per cent of the total operating expenses to freight traffic. He then divided the freight expenses as between road haul and switching and terminal movements, and by dividing the total road costs by the reported number of loaded freight car miles, with an allowance of 40 per cent for the cost of empty return haul, he obtained a road movement cost per loaded car mile of 6.928 cents. The average haul as determined by an examination of the movement of 3,731 cars through various western states was 359 miles. This multiplied by the road haul cost per mile gave a total average road haul cost on grain and grain products of \$24.87 per car. The average unit terminal cost was obtained by dividing the total number of loaded freight car miles by the average distance hauled, adding the relative percentage for empties, and then dividing the results so reached into the total yard and terminal cost. This gave a terminal unit cost of \$2.53 per car, or on the basis of four terminal movements per car, two at each end of the haul, a total terminal cost of \$10.13 per car, which, added to the road haul cost, gave a total expense of \$35 per car, while the average revenue was \$58.32 per car. The net operating revenue, he said, is therefore equivalent to a gross profit of 66.66 per cent at an operating ratio of 60.01 per cent as compared with a gross profit of 38.87 per cent on all freight at an operating ratio of 72.01, and a gross profit of 33.74 per cent on all business, both freight and passenger, at an operating ratio of 74.77 per cent. On grain alone, he said, the returns are equivalent to a gross profit of 124.34 per cent at an operating ratio of 44.57 per cent.

By similar methods he apportioned 59.16 per cent of the total operating expenses of the Santa Fe to the freight traffic and arrived at a total road haul cost of \$27 per car and a terminal cost of \$10.16 per car for grain and grain products. The average revenue for an average haul of 394 miles, as shown by the movement of 11,581 cars, was \$72.91 per car. For the St. Paul he found the cost for grain and grain products was \$30.70 per car, and the net operating revenue per loaded car of grain and products, he said, was equivalent to 65.28 per cent at an operating ratio of 60.5 per cent as compared with a gross profit of 58.66 per cent on all freight at an operating ratio of 63.03. For the Burlington road he placed the cost per car at \$30.56, as compared with an average gross revenue of \$71.65 per car, making a gross profit on operating costs of 136 per cent at an operating ratio of 42.37 per cent.

On cross-examination by C. C. Wright, general solicitor of the North Western, Mr. Wright compared Mr. Muller's formula for separation of costs between freight and passenger service with that of Mr. Hillman, and asked Mr. Muller if he agreed with Mr. Hillman. "We never have agreed on anything," said Mr. Muller. He said he had charged to freight all company

freight hauled, whether or not used for passenger service, saying that Mr. Hillman's separation of this item into freight and passenger service was impracticable.

Mr. Wright also drew an admission from the witness that in previous cases, as in this one, he had always used his formula on the heavily loaded commodities to show that they stood more than their share of the transportation costs. His contention was that the same formula would not work on the lighter loaded commodities. "If your figures here show that grain is earning too high a rate," he said, "it must necessarily follow that some other commodities are earning too low, must it not?" "That is true," said Mr. Muller.

Mr. Hillman admitted under cross-examination that he had used the gross weight basis in dividing the expenses of the North Western because of a decision of the United States Supreme Court, but he stated that he did not consider it proper in view of his experience as an accountant. Mr. Wright also challenged his calculations as making no allowance for empty car movements. Mr. Hillman insisted that his method of separating costs was better than that used by Mr. Muller.

H. W. Danforth, president of the National Council of Farmers' Co-operative State Associations, also testified in opposition to the advances in grain rates, saying the average return on farms in the corn belt states is only 3 to 3½ per cent.

J. A. O'Brien of Brownsville, Tex.; E. P. Byers of Ft. Worth, Tex.; C. E. Childs of Sioux City, Iowa, and A. A. Mullens of Iago, Tex., testified in opposition to the proposed advances in rates on fruit and vegetables from Texas. The witnesses disagreed as to whether the dealer or the grower would have to pay the advance.

When the hearing on advances of 3½ cents per 100 lb. in the rates on meat and packing house products was taken up on Monday, Mr. Heinemann introduced 82 exhibits, most of which were prepared to show that fresh meats and meat products pay higher freight revenue per car, per ton, and per train mile than the other traffic handled by western railroads. Mr. Heinemann said that the proposed advance from Omaha, St. Joseph and Kansas City to the Mississippi river and points east would total \$3,063,694. On fresh meats alone the increase would mean \$2,251,203, not including the advances which would be paid on west-bound tonnage. He compared rates on meat between the Mississippi and Missouri rivers with the divisions of the trans-continental rates, saying that the latter are far below the danger line, often used by railroad officials, of 15 cents per car mile, and that it looks as if the carriers were trying to make the packers bear the burden created by unremunerative rates on other hauls and other commodities. He also objected to the attempt to increase the cost of one of the prime necessities of life.

"The railroads," said Mr. Heinemann, "have declared that they never intended to increase the rates on packing house products above the charges contemporaneously in effect on fifth class articles. Arkansas is one of the greatest cured meat consuming sections in the United States. Yet an examination of the proposed tariffs shows that to 10 representative points the carriers are planning to put in rates on packing house products from three to 17 cents higher per 100 lb. than fifth class rates.

"The Interstate Commerce Commission, in fixing southwestern cattle rates, established a scale on hogs 114 per cent of the cattle rate; sheep and goats, 125 per cent; packing house products, 139 per cent and fresh meats 168 per cent of the cattle rates. This relationship the carriers in this case would destroy by putting in hog rates 113 per cent of the cattle rate, sheep and goats, 122 per cent; packing house products, 151 per cent and fresh meats, 189 per cent of the cattle rates. This is another graphic illustration of the manner in which the railroads seem to be endeavoring to saddle the heaviest burdens upon the packing industry.

"Not content with seeking to advance our rates on long hauls, the carriers are also endeavoring to boost our charges for inter-plant movement between our various Missouri river houses. Between Kansas City and St. Joseph we now pay 35.5 cents per

car mile on fresh meats and 24.2 cents on packing house products. Both rates yield considerable in excess of the so-called 'danger mark' of 15 cents. The carriers are also asking permission to cancel a number of carload rates on packing house products between Missouri, Kansas and Iowa points. This would have the effect of advancing those rates all the way from 17.5 to 128 per cent."

NEW CLEARANCE REGULATIONS IN ILLINOIS

Following an investigation of the subject of clearances on railroads as affecting safety of operation, the state Public Utilities Commission of Illinois has just issued regulations specifying the minimum horizontal and vertical clearances which may be established in the construction and reconstruction of any railroad or building adjacent thereto, unless permission has first been given by the commission to deviate therefrom.

Separate regulations are made for steam and electric railroads and for street railways. Only those portions relating to steam railroads are given below.

VERTICAL CLEARANCES

1. Except as hereinafter provided, no through truss bridge shall be constructed in any track, nor shall any bridge or other structure be constructed across any track over which freight or passenger cars are operated, having a vertical clearance less than 22 ft. above the top of rail for a lateral distance of 5 ft. from the center line of track. From a point 5 ft. horizontally distant from the center line of track and 22 ft. above the top of the rail, the clearance lines may extend downward at an angle to points which are 8 ft. 6 in. distant on each side of the center line of the track and 17 ft. above the top of rail.

2. At passenger stations and coach yards where passenger equipment only is handled, vertical clearances may be less than 22 ft.

3. Overhead loading platforms spanning tracks over which freight cars are handled for icing or other loading purposes may have a vertical clearance less than 22 ft., when such platforms or structures are so constructed as to open upward or outward by means of counter weights or other devices, so that such platforms shall furnish the full amount of vertical clearances specified in Rule 1 at times when cars are being switched.

4. Except at passenger terminals and in coach yards where passenger cars only are handled, all awnings and canopies spanning any track or supported at the sides thereof where such track is in an open thoroughfare, must have full vertical clearance as provided for in Rule 1. Canopies and awnings at freight houses adjoining a track not in an open thoroughfare, may be constructed with a minimum vertical clearance of 15 ft. 6 in., provided such obstruction does not extend closer than 5 ft. 6 in. from the center line of track. In every case where there is a canopy or awning at a freight house, the edge of which has a vertical clearance less than 22 ft., a warning sign shall be erected at some suitable place at each end of such canopy or awning, warning the train employees of the insufficient clearance and prohibiting them from riding on the sides of cars while in motion.

5. Where tracks other than thoroughfare tracks serve engine houses, car shops, elevators, warehouses, coal and ore tipples and industrial plants, vertical clearances less than 22 ft. may be used, provided that in no case shall this vertical clearance be less than 17 ft. for a distance of 4 ft. from the center line of track. From a point 4 ft. horizontally distant from the center line of track and 17 ft. above the top rail, the clearance line may extend downward at an angle to a point which is 7 ft. distant from the center line of track and 14 ft. above the top of rail.

6. In all cases where overhead structures span tracks with a vertical clearance less than that provided for in Rule 1, a rule must be issued by the Railroad Company prohibiting trainmen and other employees from occupying the tops of cars while in motion within certain prescribed territorial limits.

HORIZONTAL CLEARANCES

10. Except as hereinafter provided, and at switch turnouts, the distance from the center of any track to the center of an adjoining track shall not be less than 14 ft.

11. The distance from the center of any switching lead which lies adjacent and parallel to any other track (excepting a track of like character) where the switches are not operated mechanically, shall not be less than 18 ft. from center to center of tracks. The distance from center to center of two adjacent switching leads shall not be less than 21 ft.

12. Any two tracks given up wholly to passenger service, lying adjacent and parallel to each other, and leading from the main track into a passenger terminal or coach yard, may be constructed with track centers less than 14 ft., provided the track centers on the opposite sides of any such pair of tracks are not less than 14 ft., or where the face of any building or other structure is not less than 8 ft. 6 in. from the center of the adjacent track.

13. Any two adjoining freight tracks given up to freight loading and unloading purposes, such as tracks at freight houses, private industries, team tracks and like purposes, may be constructed with track centers less than 14 ft., provided the track centers on the opposite sides of any such pair of tracks are not less than 14 ft., or where the face of any building or other structure is not less than 8 ft. 6 in. from the center of adjoining track; provided also that it shall be permissible to construct on one side of any such pair of tracks a high platform for loading and unloading freight at freight houses, not less than 5 ft. 6 in. from the center of adjoining track as hereinafter specified.

14. Except as hereinafter or hereinbefore provided, no track shall be constructed adjacent to any building or other structure, nor shall any signal post, switch stand, building or other structure be constructed adjacent to any track which has a horizontal clearance of less than 8 ft. 6 in. from the center of track, measured at right angles thereto, it being understood that the horizontal clearance of 8 ft. 6 in. shall be maintained in respect to buildings from the level of the top of the rail to a point on the vertical clearance line as herein established. The clearance line for structures other than buildings and low platforms shall extend from a point 4 ft. above the top of rail, downward at an angle to a point 5 ft. 6 in. distant from the center line of track to a point which is level with the top of rail.

15. Platforms for loading and unloading of freight including livestock, the tops of which are approximately level with the floor of freight cars, may be constructed adjacent to only one side of freight tracks which are not in an open thoroughfare at a distance less than 8 ft. 6 in. from the center of track, but not less than 5 ft. 6 in. therefrom; provided, that in every such case, warning signs shall be erected at a suitable location at each end of such platform, calling trainmen's attention to insufficient clearance and prohibiting them from riding on the sides of cars while in motion.

16. Passenger loading platforms, the tops of which are level with the platforms of passenger cars, may be constructed next to tracks which are given up wholly to passenger service, at a distance less than 8 ft. 6 in. from the center line of such tracks, provided the passenger coaches are equipped with platform gates and kept closed while the train is in motion. Passenger loading platforms which do not exceed a height of 4 in. above the top of rail, may be constructed a distance of not less than 4 ft. 6 in. from the center line of track; and platforms which do not exceed a height of 8 in. above top of rail may be constructed a distance not less than 5 ft. 1 in. from the center line of track.

17. The horizontal clearances specified herein shall not apply to mail cranes when the arms of same are in position to support mail sacks for delivery to trains, provided the top arm of such mail crane when in position to support mail sacks for delivery is not above a point which is 6 in. below the lower sill of the engine cab window of the engine pulling the train which is supposed to pick up mail sacks, if such arms when in position to support mail sacks encroach upon the horizontal clearance of 8 ft. 6 in. from the center line of track.

The Use of Pulverized Fuel for Locomotives

An Outline of Results from Tests Extending Over a Year and Recently Concluded; What May Be Expected

The use of pulverized coal for heat-producing purposes is not new, this fuel having been extensively used for many years in cement and metallurgical furnaces, but while experiments have from time to time been conducted with a view to its use in the generation of steam, they were never developed to a practical and commercial conclusion.

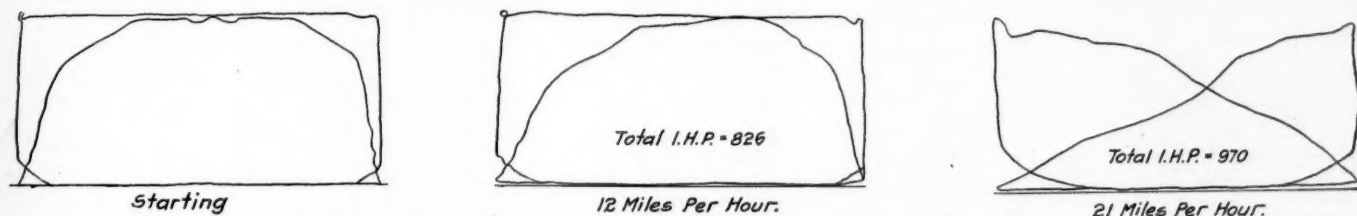
There are many reasons why a successful application of a means of burning pulverized fuel in locomotive fireboxes should be looked upon favorably. Such combustion is smokeless and there are no cinders or sparks thrown from the stack. The first of these items would bring the use of pulverized coal into careful consideration in congested terminal districts where public opinion is forcing the railways towards expensive electrification projects, while the second shows its value in the operation of steam locomotives through forests and other regions where fires are easily set. Furthermore, with the rapid inroads which are being made in the more superior qualities and grades of fuel supply of the United States, and, in fact, of the world, the cost of coal is rapidly increasing. With the application of pulverized coal burning apparatus, use can be made of the dust and refuse from mines as well as peat, petroleum coke, coke breeze lignite and other low grade coals which are under present conditions unsatisfactory for steam production in locomotives.

To produce the best results as regards complete combustion and the least trouble from ash and slag, pulverized coal should

road work to equip the existing principal coaling stations with machinery for crushing, grinding, drying and conveying the coal to a suitable storage plant as well as to the locomotive tenders.

The work of developing equipment for burning pulverized coal in steam locomotives has been carried out during the past year and a half and the results have now assumed a final and definite form, so that it is possible to give in what follows a general idea of what has been accomplished. The equipment referred to in this article has been developed by the Locomotive Pulverized Fuel Co., 30 Church street, New York, and while it is not possible to describe it at present in detail, it is expected that a more detailed description of the apparatus will be available at a later date. In order to determine the commercial practicability of the appliances which have been developed, application was made to a ten-wheel locomotive of about 31,000 lb. tractive effort, 200 lb. working steam pressure, 22 in. by 26 in. cylinders, 69 in. diameter driving wheels, 55 sq. ft. of grate area and equipped with a Schmidt superheater.

The experimental work has been carried out on this locomotive almost continuously since early in June, 1914, on a ruling grade from $6\frac{1}{2}$ to 8 miles long and also on a district of 92 miles. Some of the indicator diagrams obtained are shown in one of the illustrations. As originally built the locomotive had an exhaust nozzle 5 in. in diameter, this being approximately 19.6 sq. in. in area. The nozzle used with the pulverized coal apparatus



Indicator Diagrams Taken on a Locomotive Using Pulverized Coal as Fuel

contain not more than one per cent moisture and be of a uniform fineness, so that not less than 95 per cent will pass through a 100 mesh and not less than from 80 to 85 per cent through a 200 mesh screen. Coal must, of course, be dried either before grinding it or when burning, this being an item of expense that is necessarily present regardless of whether the coal is burned on grates or in suspension in the powdered form. When coal which is not dry is fed into a furnace the moisture is evaporated, which means that an added quantity of coal must be burned to maintain the temperature, the latter being reduced about 72 deg. F. for each one per cent of moisture entrained. As this cannot be overcome by feeding additional fuel with the same percentage of moisture, the loss of heat is about two per cent for each one per cent of moisture, this loss being further increased when applied to the usable heat above the temperature of the escaping smokebox gases. If the coal is dried before grinding, however, the cost for drying will be almost saved because of the decreased power required for pulverization and also because of the improved combustion resulting from the greater degree of fineness obtained in the dried as compared with the moist coal.

The cost for preparing pulverized coal varies with the cost of the coarse coal and with the moisture content. However, from data obtained during the past 10 years, assuming the cost of the coal at from \$1 to \$2 a ton, a total cost for preparation will vary from 25 cents to 50 cents in the case of a plant having a capacity of two tons (of 2,000 lb.) per hour to a cost of 10 cents to 20 cents in a plant of a capacity of 25 tons per hour. The amount of fuel required for drying the coal averages from one to two per cent of the coal dried. It will, of course, be necessary in rail-

was rectangular, $5\frac{1}{2}$ in. by 8 in., giving an area of 44 sq. in. With the original nozzle the back pressure at speeds of from 15 to 20 miles an hour was from 8 lb. to 11 lb., while with the rectangular nozzle the back pressure at the same speeds was from 1 lb. to 3 lb. The reduction in back pressure much more than compensated for the steam consumption of the turbo-generator as well as for any use made of the steam blower while at the same time increasing the locomotive's capacity and reducing wear and tear on the machinery. The turbo-generator, which is of 10 kw. capacity, is placed at the forward end of the locomotive in front of the smokebox or in any other convenient location, and supplies current for two motors driving the conveying and blowing machinery at the firebox end which carries the coal into the firebox.

The smokebox temperatures obtained were from 425 deg. to 490 deg. F., while the corresponding firebox temperatures ranged from 2,600 deg. to 2,850 deg. F. On no occasion did the locomotive stall because of insufficient steam; in fact, the safety valves were open at all times when the engine stalled. The tests were all conducted under the most severe conditions possible, namely, cold weather, low volatile coal, coarse pulverization of the coal, full tonnage rating and in many instances more than full rating.

The tonnage hauled on the maximum ruling grade ranged from the regular summer rating to 15 per cent greater than the summer rating in freezing weather and the locomotive accelerated the train in numerous instances on the ruling grade to speeds of from 20 to 25 miles per hour.

The coal used in these tests was ordinary bituminous coal and contained from 21 to 26 per cent volatile matter and about 15

per cent of non-combustible. When fed at the rate of 2,500 lb. to 4,000 lb. per hour the various smokebox gas analyses showed an average of less than 1 per cent of free oxygen or carbon monoxide and from 11 per cent to 14 per cent of carbon dioxide. The evaporation obtained ranged from $9\frac{1}{2}$ lb. to $12\frac{3}{4}$ lb. of water per pound of coal from and at 212 deg. F.

The coarsest grade of the coal ran 39.6 per cent through a 200 mesh screen, 20 per cent on a 200 mesh screen and 40.4 per cent on a 100 mesh screen. The finest grade ran $66\frac{1}{2}$ per cent through a 200 mesh screen, $95\frac{1}{2}$ per cent through a 100 mesh screen and $98\frac{1}{2}$ per cent through an 80 mesh screen. According to statements made before the American Society of Mechanical Engineers, the most satisfactory results are obtainable from coal which will run from 80 to 82 per cent through a 200 mesh screen and 95 per cent through a 100 mesh screen. Analyses of the coal used showed that it ranged from .67 per cent moisture, 65.16 per cent fixed carbon, 21.63 per cent volatile matter, and 13.12 per cent ash with 13,671 B.t.u. per lb., to .88 per cent moisture, 25.67 per cent volatile matter, 63.05 per cent fixed carbon and 10.4 per cent ash with 13,912 B.t.u. per lb. In the statements before the American Society of Mechanical Engineers re-

ment. The pulverized coal blowers and controllers are attached to the front of the tender coal space and the coal tanks can be applied to many tenders as at present constructed. This coal container is so arranged as to be usable for either pulverized coal or fuel oil, and the entire equipment can be readily changed without extra cost for burning fuel oil. The ordinary brick arch is used in the firebox and special brick work is used below the arch and mud ring. The refuse runs down into a collection pan below the firebox in the form of a slag which when hardened is of a glassy nature and is very easily broken and falls out when the pan is opened. About 2.5 per cent of the weight of the coal fired when it contains 15 per cent of non-combustible is deposited in the slag pan in the form of concentrated slag as compared with about 15 per cent accumulation in the ashpan when coal is burned on the grates. This is due largely to the slag containing no combustible whatever, whereas ordinary ashpan residuum usually contains considerable combustible.

The cost for preparing pulverized coal should, it is believed, be more than offset by the difference in mine cost of the mine refuse and sweepings as well as lignite and other inferior grades

| 100 Per Cent of Total Capacity Utilized. | | | | | | | | |
|---|----|----|----|-------|-------|-------|----|--|
| 1% | 2% | 3% | 4% | 5% | 6% | 7% | 8% | |
| Electric Power - All Elements Affected. | | | | | 5.79% | | | |
| Steam Loco. - Pulverized Fuel - Superheater. | | | | 4.57% | | | | |
| Steam Loco. - Hand Fired - Superheater - Security Arch. | | | | 4.01% | | | | |
| Steam Loco. - Pulverized Fuel - Saturated Steam. | | | | 3.31% | | | | |
| Steam Loco. - Hand Fired - Sat. Steam - Arch. | | | | 2.69% | | | | |
| 75 Per Cent of Total Capacity Utilized. | | | | | | | | |
| 1% | 2% | 3% | 4% | 5% | 6% | 7% | 8% | |
| Electric Power - All Elements Affected. | | | | | 5.95% | | | |
| Steam Loco. - Pulverized Fuel - Superheater. | | | | | 5.76% | | | |
| Steam Loco. - Hand Fired - Superheater - Security Arch. | | | | | 4.83% | | | |
| Steam Loco. - Pulverized Fuel - Saturated Steam. | | | | | 4.72% | | | |
| Steam Loco. - Hand Fired - Sat. Steam - Arch. | | | | | 3.84% | | | |
| 50 Per Cent of Total Capacity Utilized. | | | | | | | | |
| 1% | 2% | 3% | 4% | 5% | 6% | 7% | 8% | |
| Electric Power - All Elements Affected. | | | | 4.54% | | | | |
| Steam Loco. - Pulverized Fuel - Superheater. | | | | | | 7.05% | | |
| Steam Loco. - Hand Fired - Superheater - Security Arch. | | | | | | 5.87% | | |
| Steam Loco. - Pulverized Fuel - Saturated Steam. | | | | | 5.41% | | | |
| Steam Loco. - Hand Fired - Saturated Steam - Security Arch. | | | | | 4.75% | | | |

Comparison of Thermal Efficiency of Electric and Steam Motive Power, Showing Percentage of Power Delivered at the Rail for 100 Per Cent B. T. U. in the Coal

ferred to above, 30 per cent volatile matter was generally mentioned as a minimum for the best results. The capacity of each combination conveyor, feeder and mixer ranged from about 250 lb. of coal per hour at the lowest speed of 23 revolutions per minute of the feed screw to about 1,600 lb. of coal per hour at a speed of 133 revolutions per minute, this capacity being susceptible of increase or decrease as the demands of the locomotive may require.

The locomotive steamed satisfactorily throughout the tests; in fact, more steam was produced than was required, and there was no smoke. The exhaust steam assumed at times a slightly grayish color, but at no time was there any evidence of dust or ashes, and no cinders or sparks were emitted. There is a saving of from 15 per cent to 25 per cent in coal consumed as compared with ordinary hand firing, but it has so far been impossible to compute this definitely. No change is necessary in the boiler of the locomotive other than to remove all of the smokebox draft appliances and the grate and ashpan equip-

of coal, as compared with fuel that must be used when burning on grates. Considerable savings in the matters of inspection, maintenance and operation are also indicated through the complete elimination of grates, ashpans, smokebox netting, hand-hole plates and spark hoppers, firing tools and squirt hose, as well as trouble due to loss of fuel from the open coal space. There is no soot collection in tubes and terminal and intermediate delays due to cleaning and dumping fires and blowing out tubes are also avoided and the facilities for performing such work are practically eliminated. There being no cinders, cutting of superheater elements, etc., is eliminated. The cost of building fires is also reduced to a minimum, as no special fuel or labor is required for this purpose, it being only necessary to light a piece of oily waste or other similar material to start the fire. The fire can be extinguished when the locomotive is on sidings and at terminals, or when drifting, thus saving fuel, and it will restart from the heat of the furnace within an hour without relighting. When building fires, 200 lb. steam pressure

can be obtained from water at 40 deg. F. in 45 or 50 min. The physical requirements of firing a locomotive are reduced to those of firing with oil while at the same time a more constant firebox temperature and more uniform steam pressure are claimed to be available under varying operating conditions. Relieving the fireman of the arduous physical exertion of hand firing should result in an improved standard of applicants for this position, making it correspondingly easier to develop higher class enginemen.

The following figures should be of interest as bearing on the cost of electrification as compared with that of equipping an average modern type of locomotive for burning pulverized fuel: Cost of a new Consolidation type locomotive of 50,000 lb. tractive effort, equipped with superheater and

| | |
|--|----------|
| (a) for handfiring and burning coal on grates, approximately..... | \$22,000 |
| (b) for burning fuel oil in suspension, approximately..... | 22,750 |
| (c) for mechanically stoking and burning coal on grates, approximately..... | 24,000 |
| (d) for automatically stoking and burning pulverized coal, lignite, peat or fuel oil in suspension, approximately..... | 26,500 |
| (e) cost of electric locomotive, approximately..... | 50,000 |

Throughout the entire series of tests no trouble whatever was experienced with explosions, no tendency was found for any explosion to take place and there was no blow-back and noise such as occurs where fuel oil is used. In general, the firing of pulverized coal is conducted by means of one of two methods, one being known as the short flame method and the other as the long flame method. In the application to locomotives a combination of the two methods has been employed.

One of the illustrations shows a diagram of the thermal efficiency of electric and steam motive power under different conditions. The top portion of this diagram, in which 100 per cent of the total maximum capacity or load factor is assumed as utilized, is obviously an ideal condition, the condition in which 50 per cent is utilized being more nearly the average for steam road operation. It will be noticed that under these conditions pulverized coal shows up as extremely advantageous. These figures do not consider any emergency power plant or storage battery equipment for electrical operation.

TWO NOTABLE TRAIN ACCIDENTS

A derailment that occurred at Devon, Conn., on the New York, New Haven & Hartford, on March 23, in which an important express train was thrown off the track at a derailing switch, approaching an open drawbridge, and was prevented by a very small margin from falling down a high bank, was due to "the engineman believing that he got a clear distant signal"; and coincidentally with the report of the details of this accident we have the Board of Trade report from London giving the particulars of the collision which occurred on the Great Eastern, at Ilford, on January 1, from a similar cause. At Devon there was only one personal injury, and that slight; but at Ilford ten passengers were killed. The details of these two accidents will be of interest to readers who look upon the prevention of this class of mistakes as one of the most important problems connected with "safety first."

The train derailed at Devon was the Boston express leaving New York at 4 p. m. and the accident occurred about 5:30. The weather was clear. On sighting the home signal the engineman saw that it was against him and he applied the brakes, reducing speed to about ten miles an hour at the moment he went off the track. The engine and first three cars went over the derail, but all remained upright and the damage was small. There are several fixed spans in the bridge between the shore and the draw so that the train was stopped a considerable distance short of the opening; but the engine rested near the edge of the bank near the abutment. The engineman at fault was a runner of experience, with a good record.

The collision at Ilford occurred at about 8:40 a. m. on a clear day. A suburban passenger train from Gidea Park to London, moving at low speed, through a crossover from the local to the express track, about 300 ft. west of the station, was run into by

a train from Clacton to London, coming on at high speed on the express track. It struck the seventh car in the Gidea Park train at somewhere from 25 to 50 miles an hour. Besides the ten passengers killed upwards of 500 passengers notified the company of personal injuries or shock sustained. The signals and switches at the point of collision are controlled by Ilford West Box. Between this and Ilford East Box there is controlled-manual block signaling and there is no question but that the signals were set against the Clacton train. The engineman, Fred P. Bloomfield, has been in the service 23 years, and a runner three years and six months.

The distant signal at which the mistake was made is about 3,300 ft. from the point of collision; and at the East Box home signal, which is 1,350 ft. from the point of collision there is an automatic apparatus for putting torpedoes on the rail when the signal arm goes to stop. Neither the engineman nor anyone on the train admits having heard the torpedoes, but several competent witnesses outside convinced the inspector that the "detonators" acted properly. The engineman's testimony at the hearing was not very clear. He said that he saw the home signal at stop and that he shut off steam, though apparently not promptly; and the inspector concludes that probably the sound of the torpedoes was the first thing that made him realize his danger. Between the distant and the home signal the steam from the engine beat down and this, he says, interfered with his seeing the home signal until close to it. Bloomfield's firemen, George Albert Adams, said that he was engaged in firing when they passed the distant signal, so that he did not see in what position it was.

The inspector (Lieut. Col. P. G. von Donop) devotes considerable space to a discussion as to just where the engineman finally shut off steam, and of the reason why he did not shut off sooner, there being a good view of all the signals; but his interrogatories evidently threw little light on the main question, and he found the collision to be "entirely due to want of care on the part of Bloomfield in noting the position of the signals"; and the final conclusion is: "This collision, which was attended with such sad results and which was mainly due to the fact of the driver not noticing that his distant signal was at danger, points to the desirability of the provision of some arrangement for giving a driver an unmistakable warning as to the position of his distant signal when he passes it. Several railway companies have already made trials of devices designed for this purpose, and on some lines such devices are already in use to a limited extent. The Great Eastern does not, however, appear to have as yet taken any steps toward the provision of any such warning arrangement at their distant signals, though in the neighborhood of London they have provided a large number of emergency detonator machines at their home signals. It is, however, at the distant signal that the warning is especially needed, and in the face of this accident the attention of the company is called to the desirability of this provision."

RESULTS OF OPERATION OF TEXAS CAR EQUALIZATION PLAN

By O. C. CASTLE

Car Service Agent, Sunset-Central Lines

February 28, 1915, marked the close of the fifth month's operation of the car equalization plan entered into on October 1, 1914, between the International & Great Northern and the Sunset-Central Lines, which was described in the *Railway Age Gazette* of January 15, 1915, page 95, and January 29, page 177.

The object which the originators of this plan had in mind was two-fold: The protection of each road against misuse of its cars by the other party during periods of extreme shortage and increased flexibility of equipment with a reduction in switching expense, through the elimination of cross interchange of empty cars.

While there is no tangible basis on which to estimate the saving in switching expense, there can be no doubt that there has been a considerable saving. Before the agreement was entered

into the average number of cars of each party in use on the line of the other party was slightly in excess of 100. This number rapidly increased until on February 28, the number averaged about 500. For the Sunset-Central, for instance, it is quite obvious that the difference in these averages represents 400 Sunset-Central cars which are allowed to remain on the International & Great Northern tracks until they may be moved to us under load, whereas, under the former practice they were returned empty as soon as possible after being released, crossing on the interchange track an approximately equal number of International & Great Northern cars which we were returning empty. It will be recalled that an earlier report of operations showed how the percentage of empty to total deliveries had been reduced from 68.1 to 28.6.

Respecting the protection of our equipment against abuse, it has not been necessary to invoke that feature of the arrangement, for the reason that there has been almost a continuous surplus of all classes of cars throughout the five months covered by this report. This condition, however, has made it possible to develop that side of the equalization proposition that has to do with keeping the per diem payments approximately equal during the periods of surplus, when neither road is in need of its equipment.

In the absence of any agreement for a common use of cars, or for reciprocal storage of surplus foreign cars, it is the almost universal practice in times of surplus for roads to rid their rails of foreign cars by sending them home empty, at the same time applying their own cars for loading to the very lines whose cars are being returned empty. The excess empty haul caused by this ridiculous practice was estimated by the American Railway Association as amounting to 153,849,432 miles during the month of January, 1908, when the panic of 1907 turned an extreme shortage into a stupendous surplus in less than six weeks. With an equalization plan in operation, however, the only empty interchange of cars is that required to keep the balance approximately equal from day to day, and even this may be dispensed with by extending the plan to provide for the storage, free of per diem, of excess cars not needed by their owners.

The per diem figures for the five months furnish striking evidence of the practicability of the plan from the accounting and financial side. The figures, by months, follow:

| | | Per diem paid I. & G. N. | Per diem rec'd from I. & G. N. | Dr. | Cr. |
|---------------------|--|-----------------------------|-----------------------------------|--------|--------|
| October, 1914..... | | 3,644.10 | 3,271.05 | 373.05 | ..... |
| November, 1914..... | | 5,335.65 | 5,639.40 | ..... | 303.75 |
| December, 1914..... | | 6,517.80 | 6,103.30 | 414.50 | ..... |
| January, 1915..... | | 6,926.40 | 7,245.35 | ..... | 318.95 |
| February, 1915..... | | 6,763.95 | 7,046.10 | ..... | 282.15 |
| Total | | 29,187.90 | 29,305.20 | ..... | 117.30 |

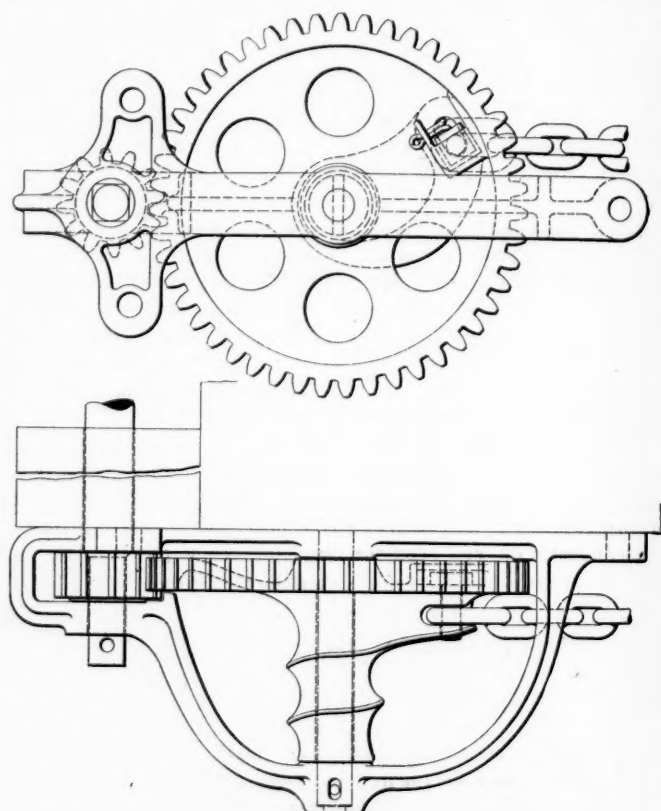
FREIGHT CAR HAND BRAKE

In the development of the geared hand brake shown in the drawing special attention has been given to the securing of a powerful brake without sacrificing rapidity of action. This device, known as the Peacock freight car brake, consists of a malleable iron frame, a geared drum and shaft, and a pinion secured to the lower end of the brake shaft. The brake is operated by the usual type of shaft, the lower end of which is forged to a square section where it passes through the pinion, a cotter through the end securing it in position. Sufficient clearance is provided through the pinion so that finish is unnecessary and the space between the shaft and the gear readily frees itself from dirt which would tend to collect were a closer fit used.

The drum and gear are cast integral, holes being cored through the web of the gear to lighten it as much as possible and also to prevent the accumulation of dirt on its upper surface. The surface of the drum is formed into a shallow spiral groove, the bottom of which is over two inches in diameter. This eliminates the twisting and cutting of the chain, caused by the small drum usually employed. The upper portion of the drum is so designed that the center line of the chain follows a

parabolic curve as the drum revolves, the end of the chain being secured at a point near the rim of the gear. This facilitates taking up the slack without loss of time or sacrifice of leverage when the effective application begins.

The chain is secured to the drum by a bolt in double shear which passes through a slotted hole. When in place the pull of the chain moves the bolt in the slot until its head occupies a pocket on the upper surface of the web from which it cannot be directly removed. A cotter through a lug on the web of the gear prevents the head of the bolt from sliding out of the pocket should the pull on the chain be released. The drum revolves on a straight unfinished bar of cold rolled steel, the lower end of which rests in a pocket in the frame. The drum is bored out with ample clearance and is packed with graphite grease to prevent corrosion when the car is standing out of service. A



Geared Hand Brake for Freight Cars

cotter through the lower end of the bar and the frame prevents it from turning and cutting the frame.

The brake has a gear ratio of 12 to 48, and with a force of 100 lb. exerted at the rim of a 16 in. brake wheel it is claimed to produce over 1,700 lb. pull on the chain. This is more than four times the force exerted on the chain by the usual type of hand brake where the chain is wound on a 1½ in. drum at the lower end of the brake shaft.

To successfully meet the conditions imposed upon a hand brake for freight equipment cars the cost must be low. With this consideration in view the use of finished parts has been avoided as far as possible, the only finished surface in the device being the bore of the drum. As shown in the drawings the frame is designed for application to cars having platform end sills, but the brake may be designed for application to freight cars of any type. It is manufactured by the National Brake Company, Buffalo, N. Y.

PORTUGUESE RAILWAY FARES INCREASED.—Press despatches report that the Portuguese railway companies have determined to raise fares 10 per cent, owing to the dearth of coal, and that the prices of other commodities, including gas, sugar and bread, have also risen.

General News Department

The anti-tipping bill recently passed by the Minnesota house of representatives has been killed by the senate committee on general legislation.

The House of the Michigan legislature has rejected the bill proposing an increase in passenger fares on railroads in Michigan based on a sliding scale in accordance with their gross earnings. The bill had been passed by the Senate.

The Ohio Public Utilities Commission, by a law just enacted, has the power to suspend proposed advances in transportation rates for 60 days, and puts on the railroads the burden of proving that a proposed increase is reasonably necessary.

The express car on Train No. 1 of the Louisville & Nashville was robbed on the line between Mobile and New Orleans, on the night of April 23, the safe in the express car being blown open. The baggageman was shot and dangerously wounded.

A large number of suits against railroads operating in Illinois have been filed by the state's attorneys of Henry, Warren and Mercer counties, Illinois, to recover fines of \$100 each for alleged violation of the law which requires railroads to reimburse shippers for loss of grain in transit.

Col. B. W. Dunn, chief inspector of the Bureau for the Safe Transportation of Explosives and other Dangerous Articles, will give an illustrated lecture on proper methods of packing and handling explosives and other dangerous articles, at the Y. M. C. A. Auditorium, Chicago, on Friday evening, April 30.

The Pennsylvania Railroad in March ran 70,196 passenger trains, and 64,067 of them—91.3 per cent—arrived at their destinations on time. The Pittsburgh Division ran 5,292 trains and 94.5 per cent of them made a perfect record. On the electric line of the West Jersey & Seashore, out of 2,480 trains, 98.2 per cent arrived on time. Three divisions had more than 97 per cent of their trains arrive on time.

In the United States District Court at Toledo, Ohio, April 27, fines aggregating \$2,700 were assessed against six railroads. The defendants admitted violations of the hours of service law. The roads fined and the amounts were: Cleveland, Cincinnati, Chicago & St. Louis, \$100; Toledo Terminal, \$200; Cincinnati, Hamilton & Dayton, \$1,600; Michigan Central, \$100; Lake Shore & Michigan Southern, \$400; Wabash, \$375.

The steamships Finland and Kroonland, formerly in the service of the Red Star Line between New York and Antwerp, are now advertised to carry passengers from New York to San Francisco, through the Panama Canal, the first sailing to be Saturday, May 1. The Finland is scheduled to sail on that day, and it is said that 350 first-cabin passengers have already engaged passage.

"Travel Stamps"

Harry I. Miller, chairman of the board of directors of the Buffalo & Susquehanna Railroad, and connected with a number of other railroads, is president of a corporation recently organized in Virginia, and having headquarters at 115 Broadway, New York City, to sell "travel stamps," to be used by merchants or manufacturers to draw trade, using them after the manner in vogue with trading stamps or coupons. The stamps are to be redeemed in certificates good for passenger transportation, railroad, street railroad and steamboat. The name of the corporation is Travel Stamps, Inc., and one of the directors is Newman Erb, president of the Minneapolis & St. Louis and a director in other roads. It is proposed to sell "travel stamps" to retailers and manufacturers of all classes of goods, in four denominations, redeemable for one mile, one-quarter, one-tenth and one-twentieth miles, stamps

to be given to purchasers, free, with purchases amounting to five cents and upward. A mile travel stamp, or its equivalent in smaller denominations, will be exchanged for "any or all kinds of first-class passenger transportation, either by boat or rail." The company expects to open offices at important railway terminals for the redemption of stamps. It is proposed in New York City to make a stamp or stamps equivalent to two miles exchangeable for one subway, surface-car or elevated ticket.

To make the stamps practically equivalent to money, an agreement has been entered into with the New York Trust Company to keep on deposit with that institution at all times a sum of money more than sufficient to redeem all stamps outstanding.

New York Excess Crew Law

The "full crew" law of the state of New York remains on the statute books. The bill to repeal it, which was passed by the Senate, was defeated in the Assembly on the last day of the session by a vote of 68 in favor of repeal and 60 against. Seventy-six votes (a majority of the whole Assembly) would have been necessary to carry the repeal.

Extensive Use of the Continuous Home Route Card

The continuous home route card for freight cars, recommended by the Committee of the American Railway Association, which was described in the *Railway Age Gazette* last week, has now been adopted by over 100 roads. From an account printed in the Equipment Register it appears that in addition to the roads named by us last week (page 903) the list includes the following:

| | |
|---------------------------------|------------------------------------|
| Alabama Great Southern | Louisville & Nashville |
| Ann Arbor | Louisville, Henderson & St. Louis |
| Atlanta & West Point | Mobile & Ohio |
| Atlanta, Birmingham & Atlantic | Nashville, Chattanooga & St. Louis |
| Atlantic Coast Line | New Orleans & North Eastern |
| Augusta Southern | New Orleans, Mobile & Chicago |
| Baltimore & Ohio Southwestern | New York, Ontario & Western |
| Bangor & Aroostook | New York, Philadelphia & Norfolk |
| Boston & Albany | Norfolk & Western |
| Boston & Maine | Rutland |
| Canadian Pacific | St. Louis & San Francisco |
| Central of Georgia | Southern Pacific |
| Central Vermont | Southern |
| Cincinnati, New Orleans & Texas | Sunset Central Lines |
| Pacific | Tennessee Central |
| Coal & Coke | Toledo, Peoria & Western |
| Cumberland & Pennsylvania | Toronto, Hamilton & Buffalo |
| Cumberland Valley | Vandalia |
| Duluth, South Shore & Atlantic | Virginia & Southwestern |
| Georgia | Western of Alabama |
| Georgia, Florida & Alabama | Wrightsville & Tennille |
| Huntingdon & Broad Top Mountain | Yazoo & Mississippi Valley |
| Kanawha & Michigan | |

All except the Atlantic Coast Line will put the new card in use on May 1; the A. C. L. a month later. It was in 1893, at the Car Accountants' convention in Indianapolis, that the continuous home route card was first proposed.

Employees' Clubs on the Lehigh Valley

The employees' club, on the Wyoming division of the Lehigh Valley, now has 300 members. It meets monthly at division headquarters. This is one of a series, the management having encouraged the organization of clubs on every division of the road. Enginemen, firemen, conductors, trainmen, yardmasters, machinists, boiler-makers, engine house foremen, section foremen, track supervisors, agents, clerks and division officers make up its membership. A small membership fee is charged to defray the expenses of the monthly meetings which are held the first Monday night of

each month, when a paper prepared by an employee of the division is read. Among the subjects which have been dealt with are: Car demurrage; the making of a valuable conductor; fuel economy; air brakes; handling of freight at transfers; first aid to the injured; signals; train operation on the Wyoming division; new book of rules; efficient and safe handling of locomotives; freight claims, causes thereof and resultant expense; duties of section foreman and handling of long trains on heavy grades.

At the first annual dinner, held recently at Wilkes-Barre, 218 employees were present. The price of the dinner was two dollars a plate. Including loss of time, the cost to many of the men amounted to from six to twelve dollars each, an indication of the interest being taken by the men in the organization.

Cole-Scoville Truck

In the description of a 2-10-2 type locomotive recently built by the Baldwin Locomotive Works for the Erie, which appeared on page 706 of our March 26 issue, a statement was made to the effect that the locomotive was equipped with the Cole trailing truck. The correct name of this truck, which is of the outside bearing type, with a hinged or floating yoke, is the Cole-Scoville truck.

International Railway Fuel Association

The following is the program of the seventh annual convention of the International Railway Fuel Association, to be held at Hotel La Salle, Chicago, May 17 to 20:

MONDAY, MAY 17

Morning session, 9:30 to 12:30.

Invocation; address by president; address by A. M. Schoyer, vice-president, Pennsylvania Lines West; report of secretary-treasurer; appointment of committee to audit books of secretary-treasurer; appointment of special committees; unfinished business; new business.

Paper: Powdered Coal—Preparation and Use in Locomotive and Stationary Boilers, by W. L. Robinson, supervisor fuel consumption, Baltimore & Ohio.

Afternoon session, 1:30 to 4:30.

Paper: Fuel Conditions in South America, by J. W. Hardy, sales agent, West Kentucky Coal Company.

TUESDAY, MAY 18

Morning session, 9:30 to noon.

Paper: Analysis of Dependent Sequence as a Guide to Fuel Economy, by Harrington Emerson, consulting engineer.

Paper: Smoke Prevention, by E. W. Pratt, superintendent of motive power and machinery, Chicago & North Western.

Afternoon session, 1:30 to 4:30.

Paper: Standardization of Coal Preparation, by H. C. Adams, president Jones & Adams Coal Company.

Report of committee on Fuel Stations, H. J. Slifer, consulting civil engineer, chairman.

WEDNESDAY, MAY 19

Morning session, 9:30 to noon.

Paper: Relation of Mechanical Stokers to the Fuel Problem, by committee on Firing Practice, D. C. Buell, director Railway Educational Bureau, chairman.

Paper: Fuel Oil for Locomotive Use, by G. M. Bean, Pacific Coast representative American Arch Company.

Afternoon session, 1:30 to 4:30.

Paper: Waste of Fuel in Railway Stationary Plants, by Joseph W. Hays, combustion expert.

Report of committee on Storage of Coal.

THURSDAY, MAY 20

Morning session, 9:30 to 1:00.

Reports of standing and special committees on: Drafting Locomotives; Fuel Tests; Fuel Accounting; Constitution and By-Laws; Subjects for Eighth Annual Meeting.

Election of officers.

Balloting for place of meeting, eighth annual convention. Adjournment.

The Traveling Engineers' Association

The following is the program for the twenty-third annual convention of the Traveling Engineers' Association, to be held in the Hotel Sherman, Chicago, from September 7 to 10:

TUESDAY, SEPTEMBER 7

Morning session: Opening exercises and consideration of subject: What effect does the mechanical placing of fuel in fire-boxes and lubricating of locomotives have on cost of operation? W. L. Robinson (B. & O.), chairman.

Afternoon session: Recommended practices for the employment and training of new men for firemen; L. R. Pyle (M., St. P. & S. S. M.), chairman.

WEDNESDAY, SEPTEMBER 8

Morning session: The advantages of the use of superheaters, brick arches and other modern appliances on large engines, especially those of the Mallet type; J. E. Ingling (Erie), chairman.

Afternoon session: How can the road foreman of engines improve the handling of the air brakes on our modern trains? C. M. Kidd (N. & W.), chairman.

Evening: The entire evening will be devoted to examining the exhibits.

THURSDAY, SEPTEMBER 9

Morning session: Difficulties accompanying prevention of dense black smoke and its relation to cost of fuel and locomotive repairs; Martin Whelan (C. C. C. & St. L.), chairman.

Afternoon session: The electro-pneumatic brake; by W. V. Turner (Westinghouse Air Brake Company).

FRIDAY, SEPTEMBER 10

Morning session: The effect of properly designed valve gear on locomotive fuel economy and operating; W. E. Preston (Southern).

Afternoon session: Scientific train loading; tonnage rating; the best method to obtain maximum tonnage haul for the engine over the entire division, taking into consideration the grades at different points on the division; by O. S. Beyer, Jr. (Rock Island).

Election of officers and adjournment.

Engineers' Society of Western Pennsylvania

At the structural section bi-monthly meeting of the Engineers' Society of Western Pennsylvania, to be held in the Society Rooms in the Oliver building, Pittsburgh, Pa., on Tuesday, May 4, a paper will be presented by F. M. McCullough, assistant professor of materials of the Carnegie Institute of Technology, entitled "Local Sands and Gravels as Aggregates in Concrete."

United Yardmasters' Association

The United Yardmasters' Association will hold its second annual convention at Seattle, Wash., on June 15 to 19. A large number of yardmasters from different sections of the United States and Canada have already expressed an intention to be present.

MEETINGS AND CONVENTIONS

The following list gives the names of secretaries, dates of next or regular meetings, and places of meeting of those associations which will meet during the next three months. The full list of meetings and conventions is published only in the first issue of the Railway Age Gazette for each month.

AIR BRAKE ASSOCIATION.—F. M. Nellis, 53 State St., Boston, Mass. Next convention, May 4-7, 1915, Hotel Sherman, Chicago.

AMERICAN ASSOCIATION OF FREIGHT AGENTS.—R. O. Wells, Illinois Central, East St. Louis, Ill. Annual meeting, May 18-21, 1915, Richmond, Va.

AMERICAN RAILWAY ASSOCIATION.—W. F. Allen, 75 Church St., New York. Next session, May 19, 1915, New York.

AMERICAN RAILWAY MASTER MECHANICS' ASSOCIATION.—J. W. Taylor, 1112 Karpen Bldg., Chicago. Annual meeting, June 9-11, 1915, Atlantic City, N. J.

AMERICAN SOCIETY FOR TESTING MATERIALS.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa. Annual meeting, June 22-26, 1915, Hotel Traymore, Atlantic City, N. J.

AMERICAN SOCIETY OF CIVIL ENGINEERS.—Chas. Warren Hunt, 220 W. 57th St., New York. Regular meetings, 1st and 3d Wednesday in month, except July and August, 220 W. 57th St., New York.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—Calvin W. Rice, 29 W. 39th St., New York. Next spring meeting, June 22-25, 1915, Buffalo, N. Y. Annual meeting, December 7-10, 1915, New York.

ASSOCIATION OF RAILWAY CLAIM AGENTS.—C. W. Egan, B. & O., Baltimore, Md. Annual meeting, May 19, 1915, Galveston, Tex.

ASSOCIATION OF RAILWAY ELECTRICAL ENGINEERS.—Jos. A. Andreucetti, C. & N. W., Room 411, C. & N. W. Sta., Chicago. Semi-annual meeting with Master Car Builders' and Master Mechanics' Associations. Annual meeting, October, 1915.

ASSOCIATION OF RAILWAY TELEGRAPH SUPERINTENDENTS.—P. W. Drew, Soo Line, 112 West Adams St., Chicago. Annual meeting, June 22-25, 1915, Rochester, N. Y.

ASSOCIATION OF TRANSPORTATION AND CAR ACCOUNTING OFFICERS.—G. P. Conrad, 75 Church St., New York. Next meeting, June 22-23, Niagara Falls, N. Y.

CANADIAN RAILWAY CLUB.—James Powell, Grand Trunk, P. O. Box 7, St. Lambert (near Montreal), Que. Regular meetings, 2d Tuesday in month, except June, July and August, Windsor Hotel, Montreal, Que.

CAR FOREMEN'S ASSOCIATION OF CHICAGO.—Aaron Kline, 841 Lawler Ave., Chicago. Regular meetings, 2d Monday in month, except June, July and August, Hotel La Salle, Chicago.

CENTRAL RAILWAY CLUB.—H. D. Vought, 95 Liberty St., New York. Regular meetings, 2d Friday in January, May, September and November. Annual meeting, 2d Thursday in March, Hotel Statler, Buffalo, N. Y.

ENGINEERS' SOCIETY OF WESTERN PENNSYLVANIA.—Elmer K. Hiles, 2511 Oliver Bldg., Pittsburgh, Pa. Regular meetings, 1st and 3d Tuesday in month, Pittsburgh.

FREIGHT CLAIM ASSOCIATION.—Warren P. Taylor, R. F. & P., Richmond, Va. Annual meeting, June 16, 1915, Chicago.

GENERAL SUPERINTENDENTS' ASSOCIATION OF CHICAGO.—A. M. Hunter, 321 Grand Central Station, Chicago. Regular meetings, Wednesday, preceding 3d Thursday in month, Room 1856, Transportation Bldg., Chicago.

INTERNATIONAL RAILWAY FUEL ASSOCIATION.—C. G. Hall, C. & E. I., 922 McCormick Bldg., Chicago. Annual meeting, May 17-20, 1915, Hotel La Salle, Chicago.

MASTER BOILER MAKERS' ASSOCIATION.—Harry D. Vought, 95 Liberty St., New York. Annual convention, May 25 to 28, 1915, Chicago, Ill.

MASTER CAR BUILDERS' ASSOCIATION.—J. W. Taylor, 1112 Karpen Bldg., Chicago. Annual meeting, June 14-16, 1915, Atlantic City, N. J.

NEW ENGLAND RAILROAD CLUB.—W. E. Cade, Jr., 683 Atlantic Ave., Boston, Mass. Regular meetings, 2d Tuesday in month, except June, July, August and September, Boston.

NEW YORK RAILROAD CLUB.—Harry D. Vought, 95 Liberty St., New York. Regular meetings, 3d Friday in month, except June, July and August, 29 W. 39th St., New York.

NIAGARA FRONTIER CAR MEN'S ASSOCIATION.—E. N. Frankenberger, 623 Brisbane Bldg., Buffalo, N. Y. Meetings, 3d Wednesday in month, New York Telephone Bldg., Buffalo, N. Y.

PEORIA ASSOCIATION OF RAILROAD OFFICERS.—M. W. Rotchford, 410 Masonic Temple Bldg., Peoria, Ill. Regular meetings, 3d Thursday in month, Jefferson Hotel, Peoria.

RAILROAD CLUB OF KANSAS CITY.—Claude Manlove, 1008 Walnut St., Kansas City, Mo. Regular meetings, 3d Saturday in month, Kansas City.

RAILROAD MEN'S IMPROVEMENT SOCIETY.—J. B. Cuffan, Erie R. R., 50 Church St., New York. Meetings, alternate Thursdays, October to May, Assembly Rooms of Trunk Line Association, 143 Liberty St., New York.

RAILWAY CLUB OF PITTSBURGH.—J. B. Anderson, Room 207, P. R. R. Sta., Pittsburgh, Pa. Regular meetings, 4th Friday in month, except June, July and August, Monongahela House, Pittsburgh.

RAILWAY ELECTRICAL SUPPLY MANUFACTURERS' ASSOCIATION.—J. Scribner, 1063 Monadnock Block, Chicago. Meetings with Association of Railway Electrical Engineers.

RAILWAY SIGNAL ASSOCIATION.—C. C. Rosenberg, Myers Bldg., Bethlehem, Pa. Stated meeting, May 26-27, 1915, Hotel Astor, New York. Annual meeting, September 14-17, 1915, Salt Lake City, Utah.

RAILWAY STOREKEEPERS' ASSOCIATION.—J. P. Murphy, N. Y. C. R. R., Box C, Collinwood, Ohio. Annual meeting, May 17-19, 1915, Hotel Sherman, Chicago.

RAILWAY SUPPLY MANUFACTURERS' ASSOCIATION.—J. D. Conway, 2136 Oliver Bldg., Pittsburgh, Pa. Meetings with Master Car Builders and Master Mechanics' Associations.

RAILWAY TELEGRAPH AND TELEPHONE APPLIANCE ASSOCIATION.—G. A. Nelson, 50 Church St., New York. Meetings with Association of Railway Telegraph Superintendents.

RICHMOND RAILROAD CLUB.—F. O. Robinson, C. & O., Richmond, Va. Regular meetings, 2d Monday in month, except June, July and August.

ST. LOUIS RAILWAY CLUB.—B. W. Frauenthal, Union Station, St. Louis, Mo. Regular meetings, 2d Friday in month, except June, July and August, St. Louis.

SALT LAKE TRANSPORTATION CLUB.—R. E. Rowland, David Keith Bldg., Salt Lake City, Utah. Regular meetings, 1st Saturday of each month, Salt Lake City.

SOUTHERN & SOUTHWESTERN RAILWAY CLUB.—A. J. Merrill, Grant Bldg., Atlanta, Ga. Regular meetings, 3d Thursday, January, March, May, July, September, November, 10 a. m., Piedmont Hotel, Atlanta.

TOLEDO TRANSPORTATION CLUB.—Harry S. Fox, Toledo, Ohio. Regular meetings, 1st Saturday in month, Boody House, Toledo.

TRAFFIC CLUB OF CHICAGO.—W. H. Wharton, La Salle Hotel, Chicago.

TRAFFIC CLUB OF NEWARK.—John J. Kautzmann, P. O. Box 238, Newark, N. J. Regular meetings, 1st Monday in month, except July and August, The Washington, 559 Broad St., Newark.

TRAFFIC CLUB OF NEW YORK.—C. A. Swope, 291 Broadway, New York. Regular meetings last Tuesday in month, except June, July and August, Hotel Astor, New York.

TRAFFIC CLUB OF PITTSBURGH.—D. L. Wells, Gen. Agt., Erie R. R., 1924 Oliver Bldg., Pittsburgh, Pa. Meetings bi-monthly, Pittsburgh. Annual meetings, 2d Monday in June.

TRAFFIC CLUB OF ST. LOUIS.—A. F. Versen, Mercantile Library Bldg., St. Louis, Mo. Annual meeting in November. Noonday meetings, October to May.

TRAIN DISPATCHERS' ASSOCIATION OF AMERICA.—J. F. Mackie, 7122 Stewart Ave., Chicago. Annual meeting, June 15, 1915, Minneapolis, Minn.

TRANSPORTATION CLUB OF DETROIT.—W. R. Hurley, Superintendent's office, N. Y. C. R. R., Detroit, Mich. Meetings monthly, Normandie Hotel, Detroit.

UTAH SOCIETY OF ENGINEERS.—Frank W. Moore, 1111 Newhouse Bldg., Salt Lake City, Utah. Regular meetings, 3d Friday in month, except July and August, Salt Lake City.

WESTERN CANADA RAILWAY CLUB.—L. Kon, Immigration Agent, Grand Trunk Pacific, Winnipeg, Man. Regular meetings, 2d Monday, except June, July and August, Winnipeg.

WESTERN RAILWAY CLUB.—J. W. Taylor, 1112 Karpen Bldg., Chicago. Regular meetings, 3d Tuesday afternoon in month, except June, July and August, La Salle Hotel, Chicago.

WESTERN SOCIETY OF ENGINEERS.—J. H. Warder, 1735 Monadnock Block, Chicago. Regular meetings, 1st Monday in month, except January, July and August, Chicago. Extra meetings, except in July and August, generally on other Monday evenings. Annual meetings, 1st Wednesday after 1st Thursday in January, Chicago.

Traffic News

David Harlowe, who recently resigned as a member of the Wisconsin Railroad Commission, has opened an office at 35 Mack block, Milwaukee, Wis., as consulting traffic manager.

The Ann Arbor has filed a suit in the Federal Court at Detroit, asking a permanent injunction restraining the state officers of Michigan from enforcing the law fixing passenger fares in the State at a maximum of two cents a mile.

The Eastern Trunk Lines and their connections, have given notice of a general increase of about two per cent. in the freight rates on wrapping, book and news paper; this in addition to the 5 per cent advance made recently.

The Chesapeake & Ohio has followed the Baltimore & Ohio in asking authority from the state of West Virginia to make a general increase in passenger rates. The present rates, based on two cents a mile, are declared unremunerative, and it is desired to advance all rates to the basis of at least 2½ cents a mile.

The Boston & Albany has announced new passenger rates, to become effective May 1, based on the opinion given by the State Public Service Commission in its recent investigation. From Boston to Worcester, 44 miles, the old rate is one dollar; new, \$1.04; Boston to Springfield, 99 miles, old rate, \$2.25; new, \$2.40; and others in proportion. Some of the rates, for short distances, are advanced one cent.

The war tax on tickets in Canada is as follows: Five cents on every parlor car seat and 10 cents on every sleeping car berth; railway and local steamship tickets 5 cents for each \$5 or fraction thereof, according to the value of the ticket; but there is no charge on a ticket costing \$1 or less. That on ocean steamship tickets varies according to the value; \$10 and under, no tax; \$10.01 to \$40, \$1; \$40.01 to \$65, \$3; \$65.01 and up, \$5. The tax applies on all tickets reading between or from points in Canada, whether such tickets are sold in Canada or in a foreign country.

Panama Canal Earnings

Up to March 1, 1915, the earnings from tolls on vessels using the Panama Canal, according to the Canal Record, fell short of meeting the expenses of operation and maintenance of the canal by \$261,098. From the beginning of the present fiscal year on July 1, 1914, to March 1, 1915, a period of eight months, the total expenditure attributed to operation and maintenance, was \$2,595,613. The total earnings from tolls in that period were \$2,334,515. In other words, on a business requiring the expenditure of \$2,595,000, the government has lost approximately 10 per cent. The operation and maintenance figures include all the diversified expenditures necessary for keeping the canal open and in order and the work of moving vessels through the locks. To such expenditures have been added a pro-rated part of the expenses of the civil government, of the sanitary work and of general administration, which three items have amounted to \$574,570 during the period.

Illinois Manufacturers' Association Sees Discrimination in Low Passenger Fares

The directors of the Illinois Manufacturers' Association have addressed a communication to the House Utilities Committee of the Illinois legislature saying: "It is unfair to the shippers of this state to be compelled to pay freight rates based upon an allowance for a deficiency in the transportation of passengers. While it is true that the price of the goods in the end absorbs the freight the fixing of a rate so high that it will take care of a loss in passenger service is not an equal distribution. Fully 50 per cent of the passenger travel is for pleasure, and is not incident to the transaction of business. It should therefore be treated to a large extent as a luxury and placed on a sound

economical basis. A conservative estimate of the amount of money paid by the manufacturers and other shippers of Illinois for railroad freight service is over \$1,000,000,000 annually. This amount should not be subjected to increase in order that passengers may be carried below the cost of transportation. It is therefore hoped that the members of the committee will report favorably on the measure authorizing an advance of one-half cent per mile in passenger rates."

Statement of Western Railways on Cummins Amendment

R. B. Scott, of the Chicago, Burlington & Quincy, H. A. Scandrett, of the Union Pacific, and Charles Donnelly, of the Northern Pacific, have filed a statement with the Interstate Commerce Commission, outlining their position as to the effects of the Cummins amendment to the act to regulate commerce, which becomes effective on June 3. The statement is as follows: "At the present time, in the case of property which is transported subject to the rules and conditions of classification there are two lawful rates: First, what is termed a reduced rate, which is applicable when the property is transported subject to all the terms and conditions of the uniform bill of lading, and second, a rate that is 110 per cent. of such reduced rate—this higher basis of rate being applicable when the property is not carried subject to all the terms and conditions of the uniform bill of lading.

"While there may be some question as to whether this or that stipulation contained in the uniform bill of lading is made unlawful by the Cummins act, there is no such question as to certain stipulations, such as those in regard to the presentation of claims. We have, then, this situation: One rate if certain conditions are incorporated in the bill of lading, and a different and a higher rate, if they are omitted.

"In that situation Congress enacts a law which prohibits the carrier and the shipper from agreeing to abide by certain of the terms of the uniform bill of lading. The rate, therefore, which was conditioned on the shipper agreeing to all the provisions of the uniform bill of lading is cancelled by act of Congress. The legal effect is no different than if the carriers cancelled from their tariffs the lower rate.

"In either event, the higher basis of rates remains. It was the lawful basis before the enactment of the Cummins act; it would have been a lawful basis if the carriers had of their own initiative cancelled the lower basis of rates, and it will be none the less a lawful basis after the Cummins act becomes effective."

This statement was filed in reply to a question by Commissioner Clark as to what would be the status under the law without any action by the Commission or by the carriers.

Canada to Cuba

Grand Trunk freight car 30017 has just returned to Canada after a unique itinerary, which began at Chicago last December. From the Grand Trunk it went to the Wabash; to the Chicago, Burlington & Quincy; to Wiggins Ferry; to the Mobile & Ohio; to the Atlantic Coast Line; to the Florida East Coast; a ferry to Havana, where it was photographed as a curiosity; returned to the Florida East Coast; to the Atlantic Coast Line; to the Norfolk & Western; to Wiggins Ferry; to the Terminal Railroad Association, St. Louis; to the Chicago & Eastern Illinois; to the Toledo, St. Louis & Western; to New York, Chicago, St. Louis; to Lehigh Valley; to New York, New Haven & Hartford; to Lehigh Valley, and to the Grand Trunk at Niagara Falls.

ALL-STEEL TRAINS IN SOUTH AFRICA.—Owing to the increasing cost of timber for coach building, the possibility of constructing passenger stock of steel is being considered by the authorities of the Union of South Africa railways, and the chief mechanical engineer has been authorized to order two trains of steel coaches for trial.

CONGO RAILWAY COMPLETED.—The railway line from Kabala (Congo) to Lake Tanganyika, on the line of the Great Lakes, which follows the course of the Lukuga, and will unite the Lualaba River to Lake Tanganyika, was laid to kilometre 267—that is to say, to its terminal point—about March 15. This event marks a notable date in the history of the Belgian Congo.

Commission and Court News

INTERSTATE COMMERCE COMMISSION

William Wrigley, Jr., of Chicago, has filed a complaint with the Interstate Commerce Commission against the charges for switching cars on industrial sidings at San Francisco and other Pacific coast terminals.

Hearings will be held by the commission beginning Monday, May 17, on various proposals of the eastern railroads to advance certain freight rates in official classification territory. These include the rates and regulations governing the transportation of beer and non-alcoholic beverages, tobacco, grain, rags and scrap.

The commission has further suspended from May 1 to November 1 tariffs of the New York Central, Pennsylvania, Baltimore & Ohio, Erie, Lehigh Valley and other railroads proposing advances in the charges for handling freight by lighter and float from and to points in New York harbor within and outside the free lighterage limits. These rates were originally suspended from January 1.

A hearing will be held before Examiner Mackley at San Francisco on June 22 relative to the ownership and operation of the steamship Great Northern. This is the ship owned by the Great Northern Pacific Steamship Company (controlled by the Great Northern) which after being launched at Philadelphia carried passengers through the Panama Canal, as it was on its way to the Pacific coast, where it is to be used in regular service.

Examiner Kelley of the Interstate Commerce Commission held a hearing at Chicago on April 26, in the matter of the withdrawal of regulations covering the concentration of dairy products, and on April 28, on minimum weights for shipments of packinghouse products, fresh meats and other articles transported in peddler cars. On April 30, Examiner Bell will hold a hearing in the matter of stopping cars in transit to complete loading or partially unload shipments.

Classification of Display Racks

W. & J. Sloane v. Southern Pacific et al. Opinion by the commission:

The commission finds that defendants' rule resulting in the imposition of higher charges on display racks, in less than carload lots, weighing less than 1,000 lb., than for similar racks weighing 1,000 lb. or more, is unreasonable, and awards reparation. (33 I. C. C., 509.)

Lack of Concurrence in Through Rates

E. I. Du Pont De Nemours Powder Company v. Wabash et al. Opinion by the commission:

The Wabash filed and posted a through tariff, naming a through rate of 90 cents a net ton on bituminous mine-run coal in carloads from Springfield and Riverton, Ill., to Mooar, Ia., in which the delivery line, the Chicago, Burlington & Quincy, was not named as a party and had not concurred. Charges were collected on shipments from and to the points named on the basis of the combination of intermediate rates. The commission awards reparation against the carrier which issued the tariff, on the showing that the complainant relied on the through rates published, to its injury. (33 I. C. C., 507.)

Change of Destination—Compensation Therefor

Doran & Company v. Nashville, Chattanooga & St. Louis, et al. Opinion by the commission:

The complainants made five shipments of lumber from Chattanooga via the Nashville, Chattanooga & St. Louis to Nashville, thence via the Louisville & Nashville to Cincinnati, the original destination. At that point three cars were reconsigned to Toronto, Ont., and charges were collected at a rate of 28 cents a hundred pounds. On the other two cars, which were reconsigned to London, Ont., charges were collected at a rate of 25 cents. These rates were the sums of the intermediate rates to and from Cincinnati, whereas the joint through rates from

Chattanooga were 22½ cents to London and 23 cents to Toronto. Requests for reconsignment filed with the agents of the railways while the shipments were en route from Chattanooga to Cincinnati were denied on the ground that the tariff did not authorize reconsignment of lumber on the basis of the through rate.

The commission finds that defendant's refusal to allow reconsignment and diversion of lumber on the basis of the through rate from the point of origin to the new destination with a reasonable charge for the extra service performed, where the contents of the car remain unchanged, where the change of destination or route does not involve an out-of-line haul, and request is made in a reasonable time, was unlawful and unreasonable. It is held that the charges collected on the shipments in question were unreasonable to the extent that they exceeded the charges that would have accrued at the joint through rates plus a maximum additional charge of \$5 per car for the extra service incident to reconsignment at Cincinnati. Reparation is awarded on that basis. (33 I. C. C., 523.)

Advances in Freight Rates from the East to St. Paul and Minneapolis Disapproved

Minneapolis Civic & Commerce Association et al. v. Algoma Central & Hudson Bay et al. (Rail-Lake-and-Rail Rates to St. Paul). Opinion by the commission:

It is held, that the proposed 90-cent scale of rates from trunk line and central freight association territories to the twin cities has not been justified by the respondents and that the 28-cent scale of differentials in the rates to the twin cities over the rates to Duluth is unduly discriminatory as against the former; that the present 83-cent scale of rates to the twin cities is not unreasonable or unlawfully discriminatory against those communities, nor is the 21-cent scale of differentials over the rates to Duluth unduly preferential of that port as alleged; that for the future any class rates to the twin cities in excess of a 21-cent scale of differentials over the rates to Duluth will be unjustly discriminatory as against the twin cities, and any class rates to the latter communities on a scale of differentials lower than 21 cents, first class, will be unduly discriminatory as against Duluth. A scale of rates, rail-lake-and-rail, from trunk line and central freight association territories to the twin cities based upon a rate of 83 cents, first class, prescribed for the future. Carriers will be expected to bring their commodity rates into harmony with the class rates. (33 I. C. C., 577.)

Rates on High Explosives to Grand Trunk Stations

Opinion by Commissioner Harlan:

Certain of the eastern carriers have proposed to cancel the joint through rates on high explosives from Baltimore, Wilmington and Philadelphia to points in the undeveloped districts of Michigan on the Grand Trunk Western, whereupon there will be left in effect intermediate rates considerably higher than the present rates. Considerable of this traffic to these points moves via various lines to Buffalo, thence through Canada over the Canadian member of the Grand Trunk System, the Grand Trunk Railway of Canada and thence to destination over the Grand Trunk Western, the domestic member of that system. Both the members of the Grand Trunk System for a number of years have joined with the lines east of Buffalo in maintaining through routes and joint rates to these destinations.

It is offered in justification that it is against the policy of the Grand Trunk Railway of Canada to maintain joint through rates on high explosives. The commission believes that it should have jurisdiction over joint rates from one point in the United States through Canada to another point in the United States. It does not at this time wish, however, to make a definite ruling upon questions involving a possible conflict of authority as between the rate regulating bodies of this country and of Canada, without a more ample consideration of the matter. It, therefore, expresses no final conclusion respecting the question of its jurisdiction.

The points in Michigan on the Grand Trunk Western may be reached over reasonably convenient routes lying wholly within the United States, as a number of the carriers operating south of the lakes in United States territory are parties to the tariffs in question. The protestants are entitled to through routes and reasonable joint rates, and the respondents are, therefore, expected to withdraw the cancellation until such routes have been established via the domestic lines at the through rates now in

effect. The Grand Trunk Western will be expected to join in all such rates and routes to local points on its rails. (33 I. C. C., 567.)

Rates on Iron Ore from Mines on the Mesabi Range

In re rates, practices, rules and regulations governing the transportation of iron ore. Opinion by Commissioner Meyer:

In this case the commission finds that the present rate of 60 cents a long ton on iron ore from mines on the Mesabi range in Minnesota to vessels at Two Harbors and Duluth, Minn., and Allouez Bay, Wis., is unreasonable and that it should not exceed 55 cents.

The case began in informal proceedings, started in December, 1908, by Leon E. Lum. The complaint was later made a formal one. The commission, however, finally decided to institute an investigation regarding the rates, practices, etc., relating to the carriage of iron ore in this territory.

In 1913 the Duluth & Iron Range shipped 1,567,000 tons of ore from the Vermillion range, 8,546,000 tons from the Mesabi range, or a total of 10,113,000 tons from both ranges; the Duluth, Missabe & Northern shipped 12,329,000 tons from the Mesabi range; the Great Northern, 13,154,000 tons from the Mesabi range; the Northern Pacific, 40,000 tons from the Cuyuna range; and the Soo line, 696,000 tons from the Cuyuna range. The following table shows the average annual number of long tons expressed in thousands for five-year periods:

| Average for five years ending Dec. 31—D.&I.R. | D., M. & N. | G. N. |
|---|-------------|--------|
| 1911 | 7,566 | 11,255 |
| 1912 | 7,801 | 10,664 |
| 1913 | 8,680 | 11,368 |
| 1914 | 7,968 | 9,938 |

It was shown, also, that since 1911 the ore tonnage of the Great Northern had been greater than that of any of the other roads, but that it was probable that the Great Northern would have a relatively smaller tonnage after 1914 because of the cancellation of a contract by which the Steel Corporation, through a subsidiary, had agreed to ship certain yearly minimum tonnages over the Great Northern.

The rate on ore from the Vermillion, Mesabi and Cuyuna ranges to the docks at Two Harbors, Duluth, Allouez Bay and Superior is uniformly 60 cents a long ton, regardless of distance. The weighted average haul, obtained by dividing ton-miles by the tons, from the Mesabi range, is 108 miles over the Great Northern, 77 miles over the Missabe and 67 miles over the Iron Range. The average haul from the Vermillion range is 89 miles, and from the Cuyuna range, 112 miles.

The rate of 60 cents was attacked as unreasonable in and of itself. There was no charge of discrimination, except that it was argued that a rate in excess of a reasonable rate would be tantamount to a rebate to the Steel Corporation, which controls the Iron Range and the Missabe. "It is suggested by carriers that the commission is not called upon to enforce the anti-trust act or the commodities clause in this case, but the fact that the Steel Corporation, through a subsidiary, the Oliver Mining Company, is the largest shipper over these roads cannot be ignored. The fact that the same corporation indirectly controls two of the roads and owns the larger portion of the ore shipped over them, demands a strict interpretation of any standard of reasonableness which is adopted, although the right of these roads to earn a fair return upon the property devoted to public use is not questioned."

Detailed cost figures were introduced by both sides. The work of considering these figures was simplified by the position taken by the carriers that the Iron Range and the Missabe were built primarily to carry ore, and that ore was so large a part of their traffic that the non-ore traffic could be regarded as a by-product.

The commission, basing its opinion largely upon the valuations made by the state of Minnesota, believed that no great error would be made in concluding that the fair value of the properties for the purposes of the case were not in excess of \$22,130,635 for the Iron Range, and \$28,464,955 for the Missabe as of June 30, 1912.

Taking these maximum valuations as an average for the five-year period ending June 30, 1914, the total operating expenses, taxes and capital charges at 7 per cent are estimated as 44.69 cents a long ton for the Iron Range and 42.05 for the Missabe. For the same valuations the results for the five years ending in 1913 are 45.04 cents for the Iron Range and 40.03 for the Missabe. If the valuations submitted by the carriers be substituted the results would be 56.96 cents, 54.88 cents and 54.26 cents for the

years 1912 to 1914 respectively for the Iron Range and 43.15 cents, 42.42 cents and 46.70 cents respectively for the Missabe. It is further held that practically every comparison that can be suggested between the ore lines of the Great Northern and the Iron Range and the Missabe point to very large profits on the ore traffic of the Great Northern, perhaps equal to those on the other two roads, and any rates found reasonable for the Iron Range and Missabe will make this traffic profitable to the Great Northern. The 60 cent rate yields average earnings per gross ton mile for the three roads of 7.098 mills and net earnings 6.338 mills.

The representatives of the roads serving the Cuyuna range said that even if no order were entered with respect to them the rates fixed for the Mesabi range would be controlling. The Soo and Northern Pacific would doubtless be justified in participating in the ore traffic at a considerably less rate than 60 cents.

An order will be entered to the effect that the rates on ore from the Mesabi range should not exceed 55 cents. No order is made with reference to the rates from the Vermillion and Cuyuna ranges. (33 I. C. C., 541.)

Trap Car Service at Chicago

William D. McHugh, attorney for a number of railroads entering Chicago, has filed a brief with the Interstate Commerce Commission on behalf of the carriers in support of the tariffs abolishing free trap car service in Chicago and immediate vicinity, and imposing a charge of four cents per 100 lb. for such service. Mr. McHugh says in the brief, that there are in Chicago over 10,000 industries, all of which ship merchandise. Of these, about 3,000 have private sidings to which, under the present tariffs, the trap car service is available. The present tariffs require that for trap car service there must be loaded a minimum of 6,000 lb. for western, and 10,000 lb. for eastern lines. An exhibit compiled for this case, listing all the trap cars handled on five of the principal railroads in Chicago for the first five days of five representative months of 1914, comprising 1,180 trap cars, shows that this service was rendered to only 71 shippers, and 822 trap cars out of a total of 1,185, were handled for only six shippers. Of the L. C. L. merchandise received and delivered by the railroads in Chicago daily, 1,564 tons is handled by tunnel, 2,636 tons by lighter, 993 tons by trap car, and 6,771 tons by team.

The average number of trap cars moved daily in Chicago is 121, and the average weight of the load is 15,500 lb. Probably because his tonnage is not equal to the minimum requirements, Mr. McHugh says, the ordinary shipper cannot avail himself of this trap car method of relieving himself of the expense of transporting his merchandise to the stations of the railroads. Consequently, the trap car service is, in effect, a privilege accorded only to the large shippers. The 7,000 industries that must transfer their merchandise by team at their own expense, are in competition with those industries for which the carriers provide these free services and are, therefore, compelled to pay an expense from which the large shippers are free.

The purpose of the carriers in filing the tariffs now under investigation, he says, is "to abolish this favoritism and make the uniform rate a rate for transportation from station to station, which is the service rendered to all shippers, and then to provide that if any shipper desires a special service, that of having his merchandise transported between the railroad stations and his warehouse door there shall be a reasonable and fair charge imposed for that special service."

To show that the proposed charge is reasonable, the brief points out that the revenue which would accrue to the carrier for the trap car service on the average load would be \$6.20 per car, while under the Lowrey tariff, \$6 per car is the minimum charge for switching throughout the Chicago district; and that testimony in this case shows that the cost of the movement of the average trap car amounts to \$6.87. Moreover, the average income from the trap car service would not equal the average of the cash outlay in the way of absorptions made by the carriers in the trap car service with the connecting lines. It is also asserted that the testimony shows that the charge of four cents a hundred pounds for trap car service as a substituted service for the teaming is a charge really less than the average teaming cost to the shippers.

STATE COMMISSIONS

The Railway Commission of Canada has adopted an order requiring railways, when they have to refund money on a ticket which has not been used, or has been but partly used, to make payment within 30 days; or, if the ticket reads over two or more lines, then within 60 days.

At the hearing before the Kansas Public Utilities Commission on the application of the Kansas roads for authority to make advances in freight and passenger rates, the Atchison, Topeka & Santa Fe filed a statement showing that it cost that company \$1,126,310 during the year 1914, to comply with state and federal laws and regulations affecting railroad operation. The expense was divided as follows: Hours of service laws, \$244,636; excess crew laws, \$60,862; boiler inspection laws, \$226,087; safety appliance laws, \$253,506; postal car requirements, \$48,180; twenty-eight-hour stock laws, \$8,601; semi-monthly pay laws, \$7,462; headlight laws, \$32,110; specific orders of state commissions, \$78,414; other enactments \$166,452.

Texas Commissioner Wants Exclusive State Jurisdiction Over Rates

William D. Williams, of the Texas Railroad Commission, has announced his intention of writing to all members of Congress, asking their support for an amendment to the act to regulate commerce to prevent the exercise by the Interstate Commerce Commission of any authority over state rates, such as those involved in the Shreveport rate case. The proposed amendment, which was recommended at the last meeting of the National Association of Railway Commissioners, is as follows:

"And, provided, that nothing in this act, nor the exercise of any authority by the interstate commerce commission by virtue thereof, shall absolve any railroad or other common carrier from obeying any rate, rule, regulation or practice of any state with respect to the transportation of passengers or property, or the receiving, delivery, storage or handling of property, wholly within one state, and not shipped to or from foreign country, to or from state or territory as aforesaid, unless any such common carrier shall have secured the judgment of a court of competent jurisdiction holding such rate, rule, regulation or practice imposed as aforesaid, to be unreasonable."

In a letter to the Texas Congressmen, Commissioner Williams says: "It seems to me obvious that the road which we are now following leads inevitably to the destruction of state regulation and to the very bitterest of commercial wars between the several states. All state-made rates must be reasonable and must under the law, afford a proper return and profit to the railroad company doing the haul. If state rates are made which do this they ought not to be set aside by the courts, or the interstate commerce commission, or by any other authority."

PERSONNEL OF COMMISSIONS

Frank A. Wightman has resigned as a member of the Missouri Public Service Commission to become superintendent of safety of the St. Louis & San Francisco, with headquarters at Springfield, Mo. Eugene J. McQuillen, formerly circuit judge at St. Louis, has been appointed a member of the commission, to succeed Mr. Wightman.

COURT NEWS

The New Jersey Court of Errors and Appeals has sustained the order of the Board of Public Utility Commissioners of that state denying the application of the West Jersey & Seashore to lease its property to the Pennsylvania for 999 years. Chief Justice Gummere, who wrote the opinion, said it was a rightful use of the powers of the legislature to delegate such regulative power to the Utility Commissioners.

In the United States District Court, at Trenton, N. J., April 27, the Lehigh Coal & Navigation Company was in-

dicted, on 30 counts, for accepting illegal rebates from the Central of New Jersey, on shipments of coal from Nesquehoning, Pa., to points in New York and New Jersey. The transactions appear to be the same as those on which the railroad company was found guilty of violation of the law a few weeks ago.

The Baltimore & Ohio has brought suit in Kanawha county, West Virginia, against the attorney general of that state and against other state officers, for an injunction to forbid the enforcement of the law of that state limiting passenger fares to the basis of two cents a mile. The Baltimore & Ohio sets forth in its complaint that it is operating its passenger trains in that state at a loss of \$9,000 a month. Announcement was made some time ago that fares would be advanced about May 1.

Judge Trieber, of the United States district court at Little Rock, Ark., has granted the application of the Kansas City Southern for authority to make passenger rates in Arkansas on the basis of 3 cents a mile, and freight rates higher than those which had been fixed by the railroad commission of that state. The railroad commission was perpetually enjoined from enforcing either the two-cent passenger rates or the reduced freight rates. A short time ago the court issued a similar injunction applying to the St. Louis & San Francisco.

Change of Destination—Limitation of Liability

A carload of goods and live-stock was shipped from Crescent, Okla., to Hill City, Kan., but the point of destination was changed by order of the shipper at Salina, Kan., to Buffalo Park, Kan. The Kansas Supreme Court holds that the entire transportation was governed by the regulations of interstate commerce, under which a carrier may limit its liability for damages to the reasonable value of the property declared in the shipper's contract.—(Kirby v. Union Pacific (Kan.), 146 Pac., 1183.)

Crossing Accidents—Looking and Listening

The Missouri Court of Appeals holds that a person who passes with a team over as much as 80 feet of the public road, when his view was unobstructed, without looking and listening, is guilty of contributory negligence, as a matter of law, although the defendant was negligent in not sounding the whistle or bell. Prior decisions of the Missouri Supreme Court have held it to be negligence to so pass over clear spaces of less than 30 feet.—(Owens v. St. Louis Southwestern (Mo.), 174 S. W., 116.)

Florida Rules Governing Use of Terminals for Rival

The Supreme Court of Florida holds that Rules 3, 15 and 17, governing the transportation of freight, promulgated by the State railroad commission, do not contemplate that a common carrier, having switching and terminal facilities for its own use, at a particular point, shall be forced, at least without adequate necessity, compensation and protection, to collect and distribute within its own switching limits for a competing line, car loads of freight destined to or arriving from points reached by its line; such carrier having no part of the line haul.—State v. L. & N. (Fla.), 67 So., 875.

Spur Track—Release for Damages by Fire

A contract between a railroad company and the owner of land adjoining its right of way provided for the construction of a spur, partly on the right of way, and partly on the adjacent land, for the material advantage of the parties, but primarily for the benefit of the owner of the land. A clause of the contract indemnified the railroad against loss and damage or expense by fire to cars and contents standing on the siding, and released it, in general terms, from all claims of whatsoever character for damages resulting to the property of the owner of the land, by reason of fire originating from the engines of the railroad. Action was brought against the railroad for the burning of a large quantity of pulp wood, stored around the side track, by the escape of fire from an engine passing on the main line. The West Virginia Supreme Court holds that the clause of the contract released the railroad from damages by fire from

locomotives on the main line as well as those on the siding. West Virginia Pulp & Paper Co. v. B. & O. (W. Va.) 84 S. E. 334.

Live Stock Law—Failure to Fence

In a locality where the Texas stock law was in force, making it unnecessary for a railroad to fence against animals, and making it unlawful for a stock owner to permit his cattle to run at large, a railroad, being forbidden under the Texas statutes to permit Johnson grass to go to seed, placed poison on the right of way, which killed cattle trespassing thereon. It was held by the Texas Court of Civil Appeals that the railroad need not foresee that stock might be running at large, nor need it employ guards to prevent cattle trespassing and being poisoned.—(Ft. Worth & R. G. v. Brown (Tex.), 173 S. W., 943.)

Lease for Elevator Space—Exempting Railroad from Liability

A railroad leased ground for a grain elevator, the lessee to assume all risk of damage arising from the movement of cars, or from the operation of the railroad in any respect, whether the result of negligence or otherwise. A freight car got off the track and was pushed through the elevator building. In an action against the railroad to recover for the damage, the Kansas Supreme Court holds that the clause exempting the railroad from liability is not in contravention of public policy, and is valid. (Griffiths Grain Co. v. St. Joseph & G. I. (Kan.), 146 Pac., 1134.)

Excess Crew Law—Construction

The Arkansas Supreme Court holds that the "Full Crew Law" of that State, which provides that it shall not apply to any company whose line is less than 50 miles in length, applies to all railroads whose entire mileage operated is more than 50 miles, whether they have 50 miles within the State or not; that the classification of railroad lines of more than 50 miles in length and lines of less than 50 miles is reasonable and proper, and that it is not an unconstitutional regulation of interstate commerce when applied to a foreign railroad engaged in such commerce.—(Kansas City Southern v. State (Ark.), 174 S. W., 223.)

Liability of Initial Carrier—Live Stock

In an action against the initial carrier for damages to a carload of horses, it was contended by the defendant that the plaintiff should not recover, because his caretaker accompanied the horses and knew exactly where the damages were inflicted, and consequently the Carmack amendment did not apply, in the absence of any difficulty in locating where the injury occurred. The Texas Court of Civil Appeals, however, holds that the act fixes absolute liability on the initial carrier, which is liable, despite the insolvency of the connecting carriers, and the fact that the statute was passed so that shippers who did not accompany their shipment would be able to hold someone liable.—(Texas Mexican v. King (Tex.), 174 S. W., 336.)

Recovery of Undercharge

After repeated interviews and correspondence with the representatives of the Louisville & Nashville, a passenger bought two round-trip tickets from Nashville to Salt Lake City, by way of Chicago and Denver, and to return via Denver, Amarillo, Ft. Worth and Memphis; and paid for each ticket \$49.50. This was \$29.15 less than the legal rate on each ticket. The passenger could have gone to Salt Lake at the rate which he paid, but over other routes. He was in no way at fault in the matter. He merely told the agent the points to which he wished to go, and that he did not wish to go and return by the same route. The agent fixed the routing and named the fare. The Tennessee state courts gave judgment for the defendant in an action to recover the undercharge; but this has now been reversed by the United States Supreme Court, holding that the rate filed under the Interstate Commerce Act is the only lawful charge, from which there can be no deviation on any pretext. Ignorance or misquotation of rates is not an excuse for paying or charging either less or more than the rate filed. It was not a case of

misrouting. A misstatement or misquotation of the rate over a given route is one thing; misrouting is another. The court held that there was no misrouting, in any proper sense, the route given by the company being that requested by the passenger.—Decided April 5, 1915.

Contracts as to Crossings

The Chicago & North Western agreed that the Milwaukee Northern might maintain its tracks across the C. & N. W. right of way and under its tracks, the M. N. agreeing, in case the N. W. built an additional track, to pay the expense of adjusting the physical situation so as to accommodate the new track. The C. & N. W. built a new track, and in an action on the contract the Wisconsin Supreme Court holds that the contract is binding on the Milwaukee Northern, notwithstanding the statute (1913, § 1797-56), declaring that every crossing, hereafter made, shall be above, below or at grade, as the railroad commission shall determine, and that the commission shall fix the proportion of the expense. The purpose of the statute was merely to promote safety as regards future established crossings—not to deal with existing crossings.—(C. & N. W. v. Milwaukee Northern (Wis.), 151 N. W., 804.)

Hours of Service Act—Emergency

In an action to recover penalties for violation of the hours of service act, by requiring telegraphers in a night and day office to remain on duty for more than 9 hours in 24-hour periods, the answer alleged as a reason for the requirement, that a train despatcher in the office became "abusive, insubordinate and defiant," and it became necessary to dismiss him, because his retention would have endangered the public, and that he was replaced as soon as possible. The Circuit Court of Appeals, Eighth Circuit, holds that this stated a cause of "emergency," within the meaning of the statute, and constituted a defense. The Court said that the danger arising from fatigue is not greater than that arising from disobedience, wilfulness, or malice. (United States v. Denver & R. G., C. C. A., 220 Fed., 293.)

Extra Fares—Powers of Commission

In an action for improper ejectment, the defendant pleaded an order of the Alabama railroad commission authorizing the collection of 15 cents extra from persons boarding the train at ticket stations without tickets. The plaintiff, on a trip where the ticket fare was 13 cents, got on the train without a ticket and was ejected on his refusal to pay the 15 cents additional. The preamble of the commission's order mentioned certain lines, but omitted the defendants'. The order, however, began: "That no railroad in Alabama," indicating that it applied to all railroads in the State. It was held by the Alabama Supreme Court to apply to the defendants' road, as otherwise it would be void for discrimination. The Court held the order to be authorized by Laws 1907, p. 711, giving the commission power to change rates, regardless of Code 1907, § 5563, fixing rates generally.—(Kimbrell v. L. & N. (Ala.), 67 So., 586.)

Georgia Railroad Tax

The roads now operated by the Central of Georgia under lease from the Augusta & Savannah and the Southwestern, were built under special charters, by which the property was not subject to be taxed higher than one-half of 1 per cent upon the annual income. The state controller having sought to tax the whole property to the lessee, the United States Supreme Court holds that only the tax provided for in the charter can be collected. Under the charter the holder of the exclusive privilege of operating thereby granted might obtain its revenue by doing the whole business itself, by letting in others to share a part of it, or by making a lease of the whole. The court considered that no change in the matter of tax exemption could have been expected to follow from the demise of the road, any more than it would have followed from the admission of another carrier to partial rights, or of an individual to carry his own goods. A similar decision was at the same time made in the case of the Georgia Railroad, leased by the Louisville & Nashville and the Atlantic Coast Line.

Railway Officers

Executive, Financial, Legal and Accounting

H. S. Buefcher has been appointed general claim agent for the Texas & Pacific, with headquarters at Dallas, Tex., in place of W. L. Chew, resigned.

E. J. Pearson, first vice-president of the Texas & Pacific, has been elected president of the Trans-Mississippi Terminal Company, with office at New Orleans, La., succeeding E. F. Kearney, resigned.

D. E. Hedges continues as auditor and assistant treasurer of the Tennessee, Alabama & Georgia, with headquarters at Chattanooga, Tenn. It was erroneously stated in our issue of last week that Mr. Hedges had resigned as auditor.

Guy J. Bunting, assistant general auditor of the Chicago, Milwaukee & St. Paul, at Chicago, has been appointed general auditor, with headquarters at Chicago, succeeding B. A. Dousman, who at his own request has been assigned to special duties in Milwaukee as assistant general auditor.

Henry W. Miller, assistant to the president of the Southern Railway at Atlanta, Ga., has been elected vice-president, with headquarters at Atlanta, and the office of first vice-president has been abolished as a mark of respect to the late Col. A. B. Andrews, the only incumbent since the organization of the company.

F. A. Lehman, who has been acting general superintendent of the eastern lines, Western district, of the Atchison, Topeka & Santa Fe, at Newton, Kan., for the past six months, will return to the position of assistant to vice-president, with headquarters at Chicago, on May 1. E. Raymond, who took Mr. Lehman's place temporarily, returns to Newton as general superintendent.

The receivers of the Chicago, Rock Island & Pacific have announced the following appointments: George H. Crosby, vice-president, secretary and treasurer, has been appointed secretary and treasurer; H. M. Sloan, assistant to the president, has been appointed assistant to the receivers; M. L. Bell has been appointed general solicitor, and F. Nay has been appointed controller, all with offices at Chicago. White & Case, of New York, have been appointed general counsel.

Operating

The office of T. W. Evans, general superintendent, Second district of the New York Central, has been removed from Syracuse, N. Y., to Buffalo.

A. C. Ridgway, second vice-president of the Chicago, Rock Island & Pacific, has been appointed chief operating officer for the receivers, with headquarters at Chicago.

F. A. Wightman, who has been a member of the Missouri Public Service Commission, has resigned to become superintendent of safety of the St. Louis & San Francisco, with headquarters at Springfield, Mo.

M. A. Mulligan, general yard inspector at South Bethlehem, Pa., has been appointed acting superintendent of the New York division of the Lehigh Valley, with office at Jersey City, N. J., vice M. C. Roach, deceased.

Traffic

J. E. Gorman, first vice-president of the Chicago, Rock Island & Pacific, has been appointed chief traffic officer for the receivers, with office at Chicago.

Engineering and Rolling Stock

J. A. Shaw, electrical engineer of the Canadian Pacific, at Montreal, Que., has been appointed general electrical engineer, with headquarters at Montreal.

C. W. Van Buren has been appointed general master car builder of the Canadian Pacific, with headquarters at Montreal, Que., in place of R. W. Burnett, resigned.

H. A. Macbeth, division master mechanic of the New York, Chicago & St. Louis at Conneaut, Ohio, has been appointed superintendent of motive power, with headquarters at Cleveland, succeeding E. A. Miller, deceased. T. C. Baldwin has been appointed master mechanic, with headquarters at Conneaut, to succeed Mr. Macbeth.

Purchasing

F. D. Reed, assistant to the vice-president and purchasing agent of the Chicago, Rock Island & Pacific, has been appointed general purchasing agent, with headquarters at Chicago.



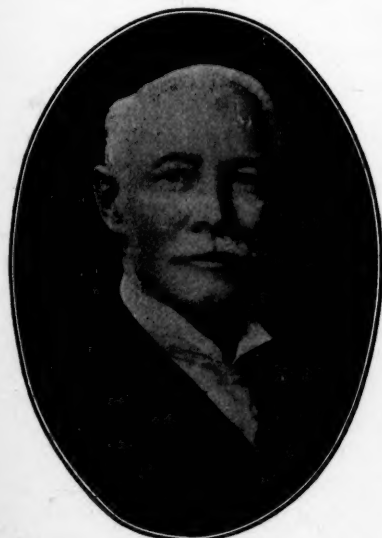
F. D. Reed

Mr. Reed was born April 22, 1868, at Fort Dodge, Iowa, and was educated in the public schools of Chicago. He entered railway service September 24, 1884, as wheel inspector of the car department for the Pennsylvania Lines West of Pittsburgh, at Chicago, which position he held until March, 1885, when he became clerk and timekeeper. In September, 1890, he was made chief clerk of the car department and held that position until July, 1895, when he was appointed assistant chief motive power clerk at Fort Wayne, Ind. In February, 1900, he was appointed chief motive power clerk and remained in that capacity until April, 1904. He then entered the service of the Chicago, Rock Island & Pacific as chief motive power clerk at Chicago. In February, 1906, he was made general storekeeper at Silvis, Ill., and held that position until May, 1910, when he was appointed assistant to the vice-president of the purchasing department, at Chicago. On June 1, 1911, he was also appointed purchasing agent of the same road.

OBITUARY

Eli A. Miller, superintendent of motive power of the New York, Chicago & St. Louis, with offices at Cleveland, Ohio, died at his home in Cleveland, on April 18, after having been

ill with pneumonia since April 7. Mr. Miller was born May 1, 1847, in Washington county, Pa., and was educated in the public schools. He entered railway service in 1865, with the Cleveland & Pittsburgh, and was consecutively laborer and helper until 1866. From 1866 to 1871, he was machinist apprentice and machinist with the Pittsburgh, Cincinnati & St. Louis, at Dennison, Ohio. From 1871 to 1873, he was machinist for the Louisville & Nashville, at Bowling Green, Ky. In 1873, he was made foreman of the Pittsburgh, Cincinnati &



E. A. Miller

St. Louis, and later, in 1880, he was made roundhouse foreman of the same road, at Columbus, Ohio. In 1882, he was

appointed master mechanic of the New York, Chicago & St. Louis, at Conneaut, Ohio, which position he held until May 1, 1905, when he was appointed superintendent of motive power of the same road, with office at Cleveland.

E. H. Calef, general freight agent of the St. Louis, Iron Mountain & Southern, died on April 21, at his home in St. Louis, Mo., at the age of 48.

Samuel Bancroft, Jr., chairman of the board of directors of the Huntington & Broad Top Mountain Railroad & Coal Company, died on April 22, in a hospital in Philadelphia, Pa., at the age of 75.

John F. Boniger, secretary and treasurer of the Texas-Mexican Railway, died at Laredo, Tex., on April 21, aged 49 years. He had been secretary and treasurer of this company for the past 22 years.

Lieut.-Colonel Lacey R. Johnson, who was appointed general welfare agent of the Canadian Pacific in March of this year, died on April 17, at the age of 60. He had been in the service of the Canadian Pacific since 1882.

William E. Chamberlain, formerly, from July, 1898, to April, 1904, general manager of the New York, New Haven & Hartford, died on April 22, at his home in Brookline, Mass., at the age of 80. At the time of his death Mr. Chamberlain was general manager of the Armstrong Transfer Company.

William H. Bancroft, vice-president of the Oregon Short Line, and first vice-president of the San Pedro, Los Angeles & Salt Lake, died at Salt Lake City, on April 22, of apoplexy.



W. H. Bancroft

Mr. Bancroft was for several years vice-president and general manager of the Oregon Short Line, but retired from active service on February 1, 1914, retaining the title of vice-president. He was born on October 20, 1840, at Newberg, Ohio, and entered railway service in April, 1856, as telegraph operator and ticket clerk of the Michigan Southern. From 1861 to 1869, he was division operator, clerk and despatcher on the Erie, and from 1869 to 1872, was despatcher, superintendent, clerk and train despatcher on the Kansas Pacific. On October

20, 1872, he was appointed assistant superintendent of the Atchison, Topeka & Santa Fe, and in May, 1875, was appointed superintendent of the St. Louis, Lawrence & Western. For a short period in 1878 he was chief despatcher of the Missouri, Kansas & Texas, and from April, 1878, to July 28, 1886, was superintendent of various divisions of the Denver & Rio Grande. From August 15, 1884, to July 29, 1886, he was also receiver of the Denver & Rio Grande Western. On the latter date he was appointed general superintendent of the Denver & Rio Grande, which position he held until 1890, when he entered the service of the Union Pacific as general superintendent of the Mountain division. This position he held until March, 1897, when he was made vice-president and general manager of the Oregon Short Line. On January 15, 1904, he was made general manager of the Union Pacific. In April, 1904, he returned to the Oregon Short Line as vice-president and general manager, which position he held until February 1, 1914. From November, 1904, to February, 1905, he was also acting general manager of the Southern Pacific. In March, 1905, he was also elected first vice-president of the San Pedro, Los Angeles & Salt Lake, and on November 1, 1906, also president of the Utah Light & Railway Company.

Equipment and Supplies

CAR BUILDING

THE CHICAGO & NORTH WESTERN, it is reported, may increase its recent inquiry for box cars from 2,000 to 3,000.

THE MINNEAPOLIS, ST. PAUL & SAULT STE. MARIE has ordered 400 40-ton box and 100 40-ton steel automobile cars from the American Car & Foundry Company.

THE PENNSYLVANIA LINES WEST have divided an order for 150 steel underframes, between the Ralston Steel Car Company and the Greenville Steel Car Company.

THE RUSSIAN GOVERNMENT is reported to have placed an order for 17,100 air brakes with the Westinghouse Air Brake Company. This item has not been confirmed.

THE CHICAGO, MILWAUKEE & ST. PAUL has ordered specifications prepared for 2,000 freight cars to be built at its own shops, and has ordered 7 sleeping cars from the Pullman Company.

IRON AND STEEL

THE CHICAGO, BURLINGTON & QUINCY has ordered 2,000 tons of rails from the Illinois Steel Company.

THE CHICAGO RAILWAYS COMPANY has ordered 20,000 tons of girder rails from the Lorain Steel Company.

THE BUFFALO, ROCHESTER & PITTSBURGH has ordered 2,000 tons of steel rails from the Carnegie Steel Company.

THE ATLANTIC COAST LINE has ordered 6,000 tons of steel rails from the Tennessee Coal, Iron & Railroad Company.

THE KANSAS CITY SOUTHERN has ordered 6,000 tons of steel rails from the Algoma Steel Corporation, Ltd. These rails are to be rolled under the American Railway Engineering Association specifications, with the nick and break test.

SIGNALING

Block Signals on New York Elevated Lines

The New York State Public Service Commission, First District, is keeping up a pressure on the Interborough Rapid Transit Company, New York City, to completely equip all of the lines operated by it, both subway and elevated, local as well as express tracks, with the most complete automatic block signal protection.

The express tracks in the subway have complete automatic block signal protection, with automatic train stops and with signals and stops at the approach to the stations placed close together for the purpose of regulating the speed of trains which are to stop at the stations. For several years past the company has been extending the use of block signals, including the train stops, on the local tracks, although on these the trains, in most cases, stop about every quarter mile, and the speed consequently is always low. Following a slight collision on the elevated lines, last December, the State Commission called upon the road to present plans for complete signaling of the elevated lines. The president of the company, in his reply, expressed the intention to provide complete signaling equipment on the new express tracks of the elevated lines, now being built, but in regard to the local tracks said that complete signaling would reduce the capacity of the lines; the present practice being to run trains on these lines constantly with speed under control. With this arrangement, trains in the congested hours may be run as close together as is necessary. The Commission, however, is not satisfied with the attitude of the road and has adopted a resolution calling upon the company to make a trial installation on the elevated lines not later than October 1, next; to make a thorough test as soon as practicable, and by June 1, 1916, to be prepared to submit to the Commission all necessary information as to whether such trial system shall be extended throughout the whole of the elevated lines. This resolution evidently contemplates the introduction of "speed control" signaling throughout all the lines.

Supply Trade News

The Carbo Steel Post Company, Chicago, has started construction work on a new plant at Cambridge, Ohio.

The Dearborn Chemical Company, Chicago, has opened an office in Edificio del Banco Anglo Sud-Americano, Buenos Aires, Argentine, in charge of Edward C. Brown.

The B. W. Parsons Co., dealing in railway material and mill supplies, has moved its offices in St. Paul, Minn., from the Pioneer building to 1306 Merchants Bank building.

The C. W. Hunt Company, Inc., manufacturers of coal handling and conveying machinery and small motor trucks, has moved its New York office from 45 Broadway to the eleventh floor of the new building of the Adams Express Company, 61 Broadway.

The Chicago office of the Westinghouse Electric & Manufacturing Company has taken over the sale of Nuttall gears, pinions and trolleys, manufactured by the R. D. Nuttall Company, Pittsburgh, Pa., for the electric railway, mining and industrial fields in the Chicago territory.

The eleventh annual convention of the Associated Advertising Clubs of the World will be held in Chicago, June 20 to 24, in the Auditorium theater. Various departmental meetings will also be held in the Auditorium hotel. One of the features of the convention is to be the educational exhibit of trade and technical publications. A very comprehensive program is planned and many prominent business men will speak. It is expected that over 10,000 men will attend the convention.

The Linde Air Products Company, New York, has purchased a factory site in St. Louis on Forest Park Boulevard, between Sarah street and Boyle avenue; and the work of erecting buildings will be started as soon as plans can be drawn and contracts awarded. The St. Louis plant will be the fourteenth erected by the company, and with its completion Linde oxygen will be distributed from 39 points. In addition to oxygen the Linde Air Products Company also produces nitrogen and other rarer gases contained in the atmosphere.

At the annual meeting of the stockholders of the Joseph Dixon Crucible Company, held in Jersey City, on April 19, the former board of directors was re-elected for the ensuing year. The vote recorded was the largest ever represented at an annual election—19,519 shares out of a possible 20,000. The directors re-elected the following officers: George T. Smith, president; George E. Long, vice-president; J. H. Schermerhorn, treasurer; Harry Dailey, secretary, and Albert Norris, assistant secretary and assistant treasurer.

L. S. Brach Supply Company, New York, is about to move its factory to larger quarters at 129 Sussex avenue, Newark, N. J. An extensive laboratory for the testing of the company's apparatus has been included in the new factory, besides ground space for the erecting of signals for testing before shipment. Included in the products that will be manufactured in the Newark plant are: Brach automatic flagman, arresters, hydro-grounds, recorders, switch devices and concrete products. The Solderall Company, a subsidiary, will also have its products manufactured in this plant.

The report of the United States Steel Corporation and its subsidiary companies for the quarter ended March 31, 1915, shows total net earnings for that period of \$12,457,809, and a deficit, after payment of interest and preferred dividends, of \$5,389,861. This compares with total net earnings of \$10,933,170, and a deficit of \$5,606,283 for the previous quarter, and with the total net earnings of \$17,994,381, and a deficit, after dividends, of \$6,289,644 for the quarter ended March 31, 1914. During the quarter last mentioned, however, the Steel Corporation was paying dividends of 1¼ per cent. on its common stock, while at present no dividends are being paid on that stock.

Railway Construction

ALABAMA, TENNESSEE & NORTHERN.—This company is planning to start work soon on the extension projected last year from the present northern terminus at Reform, Ala., north for about 70 miles to a connection with the Illinois Central.

BOSTON (MASS.) ROADS.—Governor Walsh has signed a bill ordering the removal of the elevated structure in Charlestown, and the construction of a subway 1.25 miles long to Sullivan square to replace it.

CHESAPEAKE & OHIO.—Contracts for the construction of 29.8 miles of the Chesapeake & Ohio Northern from a connection with the Chesapeake & Ohio in Kentucky to a connection with the Norfolk & Western near Waverly, Ohio, have been let to W. W. Boxley & Co., Roanoke, Va.; the Rinehart & Dennis Company, Charlottesville, Va.; Winston & Company, Richmond, Va., and the Robert Grace Contracting Company, Pittsburgh, Pa. (April 23, p. 913.)

CHESAPEAKE & OHIO NORTHERN.—See Chesapeake & Ohio.

EAST & WEST COAST.—Construction work on the line from Bradentown, Fla., southeast via Manatee, East Manatee, Alsace, Lorraine, St. Claire, Myakka City, East Myakka, Parkton, Pine Level and Belgium to Arcadia, 49.8 miles, has been completed with the exception of the stations and section houses, and the line is to be put in operation on May 1. The maximum grade is 0.5 per cent, and the maximum curvature 2 deg. There is one steel bridge and about three miles of wooden trestle on the line. The company expects to develop a traffic in lumber, naval stores, citrus fruits, livestock, etc. Allen W. Jones, president; W. B. Wilson, vice-president, Bradentown.

FLORIDA ROADS.—The Port Commission of Jacksonville, Fla., has given a contract to A. J. Mills, Jax, Fla., to build the connecting railroad and freight yards within the city of Jacksonville. M. Corse, chairman, and F. W. Bruce, chief engineer, Jacksonville. (February 26, p. 389.)

LEXINGTON & EASTERN.—See Louisville & Nashville.

LOUISVILLE & NASHVILLE.—The Lexington & Eastern is building a five-mile spur line up First creek in eastern Kentucky from a connection with the North Fork extension to the lands of the Haley Coal Company.

LOUISIANA ROADS ELECTRIC.—A company is being organized to build an electric line from Rayville, La., south to Alto, thence to Egypt, 22 miles. The company expects to develop a traffic in cotton, general freight and passengers and farm products; three stations will be put up on the line. T. J. Coenen, Rayville, is back of the project. (April 16, p. 871.)

MERIDIAN & MEMPHIS.—Construction work on the extension from Union, Miss., west to Sebastopol, about 13 miles, has been suspended, it is said, until the completion of a new survey which may require a change of line. (January 29, p. 211.)

NEW YORK SUBWAYS.—The New York Public Service Commission, First district, has awarded a contract for the construction of Section No. 2 of Route No. 12 to the Inter-Continental Construction Corporation, the lowest bidder at \$2,744,263. This section is a part of the Eastern Parkway subway in the borough of Brooklyn, between Prospect Park Plaza and a point about 600 ft. east of Nostrand avenue. (March 26, p. 720.)

Bids will be opened by the commission on May 18, for the construction of Section No. 2 of Route No. 49, which is that part of the Gravesend avenue elevated railroad in Gravesend avenue and Shell road, between Bay Parkway and Avenue X, in the borough of Brooklyn. The Gravesend avenue elevated railroad will connect the Fourth avenue subway with Coney Island.

OCILLA SOUTHERN.—This company has secured trackage rights over the Hawkinsville & Florida Southern from Pope City, Ga., to Hawkinsville, and as soon as the Ocilla Southern extension is completed into Pope City, probably by July next, trains will be operated into Hawkinsville. (March 26, p. 720.)

OCMULGEE VALLEY.—Work is now under way, it is said, on the line from Lumber City, Ga., southwest to Jacksonville, about

20 miles, and track has been laid on about 10 miles. C. S. Smith, president; J. C. Work, chief engineer, Lumber City. (March 26, p. 720.)

PORTLAND RAILWAY, LIGHT & POWER.—It is reported that this company contemplates the construction of a new line from either Cottrell on the Mount Hood line or through Sandy, Ore., for a distance of 18 miles.

SOUTHERN NEW ENGLAND.—Work is now under way on about 58 miles of the line building from Palmer, Mass., southeast via Brimfield, Fiskdale, Southbridge, Sandersdale, Webster, Douglas, Millville, Woonsocket, R. I., and Pawtucket to Providence, R. I., about 75 miles. John Marsch, Southbridge, Mass., is the contractor. The cost of the work will be about \$80,000 a mile. The maximum grade will be 1 per cent compensated and the maximum curvature 6 deg. The work is very difficult, about 60 per cent being rock work. There will be 22 steel and 74 wooden bridges, also one viaduct 1,200 ft. long and 125 ft. high on the line. This company, which was organized by the Grand Trunk, started work in 1912, and early this year petitioned the state legislature of Rhode Island for an extension of time to July, 1917, in which to complete work on the section in Rhode Island. Under the terms of the original charter the section in Rhode Island was to be finished by July, 1915. E. C. Smith, president, J. M. Morrison, chief engineer, St. Albans, Vt. (February 12, p. 289.)

WESTERN MARYLAND.—This company has arranged for track-age rights over two lines of the Baltimore & Ohio, one from Rockwood, Pa., for about 20 miles into Somerset county and the other from Connellsville, Pa., to Fairmont, W. Va. In each case the Western Maryland will build short spurs to reach coal mines. The construction involved in these spurs, which are now being located, will not exceed eight or ten miles.

WEST VIRGINIA ROADS (Electric).—Work is now under way, it is said, on an electric line for the Princeton Power Company from Princeton, W. Va., southwest to Bluefield, 12 miles. Much of the grading work has been completed and track laying is expected to be started in the near future. S. J. Evans, president, Princeton.

RAILWAY STRUCTURES

BELOIT, WIS.—The Rockford & Interurban Railway will build a timber bridge of 55 spans of 16 ft. length over the Rock river near Beloit. The estimated cost is \$12,000. Work is to be done by company forces. Creosoted yellow pine will be used. W. S. Hubbard of Rockford, Ill., is the chief engineer.

CHICAGO, ILL.—The contract for the foundation work for the Pennsylvania Lines' new freight terminal at Chicago, mentioned in last week's issue, was let to the Sumner-Sollitt Company, Chicago.

LEXINGTON, KY.—The Chesapeake & Ohio has not yet completed plans for new shop buildings at Lexington. A contract has recently been let to the Combs Lumber Company, Lexington, for building a seven-stall roundhouse at Netherland, just outside of Lexington.

NEW YORK.—A bridge is to be built over Westchester creek at One Hundred and Seventy-seventh street, in the borough of the Bronx. Detail plans have not yet been completed. The plans will call for a structure to carry double track for the operation of electric street railway cars.

PITTSBURGH, PA.—Plans are being made by Allegheny county officers to build a suspension bridge with a double deck approach viaduct, over the Ohio river at Pittsburgh. The proposed structure will require 15,000 tons of steel, and will carry tracks for the operation of steel railway cars. The cost of the work will be \$1,500,000. J. G. Chalfant, county engineer, Pittsburgh, may be addressed.

READING, PA.—The Philadelphia & Reading has let contracts for rebuilding a bridge under the Lebanon Valley tracks over Sixth street, Reading, as follows: Masonry and concrete work to Seeds & Derham; structural steel work to the McClintic-Marshall Company, and waterproofing to James Kelly. The new structure will consist of deck-plate girders, covered with solid concrete floor waterproofed, and all exterior girders will be incased in concrete.

SIDNEY, OHIO.—The Cincinnati, Hamilton & Dayton has asked bids for a new steel bridge at Sidney to be built at an approximate cost of \$20,000.

Railway Financial News

ATLANTIC COAST LINE.—J. P. Morgan & Co., the First National Bank and the National City Bank, all of New York, are offering \$5,000,000 Atlantic Coast Line general unified mortgage 4½ per cent bonds of June 1, 1914-1964 at 89¼, yielding about 5.10 per cent interest on the investment. These bonds are issued under the mortgage which provides for \$200,000,000 of bonds, of which \$88,921,685 are reserved to retire underlying liens and of which, including the present issue, there are now \$29,951,000 bonds outstanding. The proceeds from the sale of the bonds are to be used to reimburse the company for expenditures for additions and betterments and for refunding underlying debt which has matured and been paid off.

BALTIMORE & OHIO.—Kuhn, Loeb & Company and Speyer & Company, both of New York, have bought from the Baltimore & Ohio \$40,000,000 4½ per cent secured notes, one-half maturing in two years and one-half maturing in three years. This amount embraces the entire authorized issue of such notes. The subscription list for the Baltimore & Ohio 4½ per cent secured gold notes has been closed by Kuhn, Loeb & Company and Speyer & Company, the \$40,000,000 notes offered for subscription today having been over-applied for. Offering price was 99½ for the two-year, and 99 for the three-year notes.

CHICAGO, ROCK ISLAND & PACIFIC.—A minority stockholders' committee has been formed, consisting of N. L. Amster, Warren C. Crane, Alfred J. Keppelmann and Frank W. Bauder, of New York; E. S. Dickerson, of Philadelphia; George G. Prentice, of New Haven; Peter G. Ten Eyck, of Albany; Nathaniel French, of Davenport, Iowa; George W. Smith, of Maine, and Courtlandt Linkroum, of New Jersey.

DELAWARE, LACKAWANNA & WESTERN.—Suit has been brought by minority holders of the Morris & Essex against the Delaware, Lackawanna & Western, which leases the Morris & Essex, claiming that \$1,500,000 more should have been paid to stockholders in the last 10 years than was paid because of the improper increase in the funded debt of the Morris & Essex. About \$10,000,000 of this increase was to reimburse the Lackawanna for expenditures made on the Morris & Essex and charged to the Morris & Essex property account, which expenditures would have been, if made on the Lackawanna itself, charged to expenses.

ERIE.—Drexel & Company, of Philadelphia, and the Guaranty Trust Company, New York, are offering \$6,000,000 Genesee River Railroad first mortgage 6 per cent sinking fund bonds, due July 1, 1957, at 103¾, yielding about 5.75 per cent. These bonds are secured by a first mortgage on the new Genesee River cut-off of the Erie and are guaranteed principal and interest by the Erie.

MISSOURI, KANSAS & TEXAS.—Holders of more than 73 per cent of the \$19,000,000 outstanding 5 per cent notes due May 1 had up to April 27 agreed to extend their notes at 6 per cent. The time for the deposit of these notes has been extended to May 1. Additional security, consisting of \$1,309,000 5 per cent consolidated mortgage bonds of the Missouri, Kansas & Texas, has been deposited with the Central Trust Company as trustee. The company has made no arrangements for the payment of non-assenting notes. Some of the notes—the exact amount can only be estimated—are held abroad and of the notes held in England some have already been mailed for deposit in the United States. Under the British treasury ruling the notes cannot be deposited in England but must be sent to this country if their holders desire to extend them.

MORRIS & ESSEX.—See Delaware, Lackawanna & Western.

NEW YORK, NEW HAVEN & HARTFORD.—Stockholders on Saturday, April 24, approved the following proposals made by the board of directors:

1. The reduction in the capital stock to \$157,117,900, by the cancellation of \$22,899,100 stock now in the treasury.
2. The acceptance of amendments to the company's charter

to bring it in conformity with recent legislation enacted in Connecticut and in Rhode Island.

3. The authorization of an issue of bonds by the New Haven, as successor to the New York, Providence & Boston, and as successor to the New Haven & Northampton, under mortgages of those companies dated 1892 and 1906, respectively.

WABASH.—Judge Adams, of the federal district court, has signed an order authorizing the sale of the Wabash at an upset price of \$21,000,000. The upset price had previously been fixed at \$34,000,000.

The reorganization plan has been completed by representatives of the leading security interests in the property. A committee of seven, consisting of an equal number of members from the Wallace protective committee and the Pierce committee of the refunding and extension bonds and a representative of the stockholders' committee, was appointed to proceed immediately with the work of reorganization.

Kuhn, Loeb & Company, New York, have agreed to underwrite the plan, under which it is proposed to raise \$27,720,000 of new capital by an assessment of \$30 a share on the stock. The holders of the \$35,600,240 first refunding and extension 4s will be given for their bonds a new and special preferred stock. Three classes of stock will be issued, common, preferred and the special preferred. Holders of the present common are to receive something more than a half of their holdings in new common with the remainder in new preferred, upon payment of the assessment. Holders of the present preferred are to get more than a half in new preferred and the remainder in new common, upon payment of the assessment.

WESTERN PACIFIC.—The Wall Street Journal says that there are rumors to the effect that Governor Johnson, of California, has dropped his plan to buy the Western Pacific for California and that these reports are circumstantial and it is believed that the governor, on the advice of his lawyers and experts who went thoroughly into the matter, has decided that the plan is not feasible.

RAILWAY EXTENSION IN ARGENTINA.—The firm of Anastasio Lopez y Cia. (San Luis, F. C. P., Argentina) has secured a concession from the province of Mendoza to construct a 71-mile line from General Alvear to San Rafael, province of Mendoza. The concession includes branch lines to Las Malvinas, 25 de Mayo, and Cuadro Nacional, about 30 miles of track in all, and such other branches up to a distance of 6 miles from the main line as may be necessary to connect the system with centers of production needing an outlet. These additional branch lines are estimated at another 30 miles for the present. The region traversed is said to be well irrigated and under intensive cultivation. The system adopted for the new line is that of the so-called economical secondary railway with a 75-centimeter (2.46 ft.) gage. Steam traction will be used at first, but it is planned to electrify later. Work will be commenced in about six months.

GERMAN RAILWAY EMPLOYEES.—According to reports the employees of the Prussian State Railways who are in sympathy with trade unionism have a very real grievance against the government. The railway administration has for a number of years obliged men entering the service to sign a declaration that they would not become members of a trade union or a Socialist society, and would not attend meetings or read newspapers of the kind. On the outbreak of war, these restrictions remained unrelaxed so far as concerned railwaymen employed prior to mobilization, but new employees who have been engaged to take the place of those with the colors have not been compelled to sign the declaration. The result is a most anomalous and unfair position. Socialist and trade union newspapers are now allowed to be sold at the railway bookstalls, and to be sent to men at the front, but the bulk of the railway employees are not permitted to read them, although they can buy these publications at the stations where they are engaged, which they could not do prior to the war. The concession is, of course, due to the government's desire to placate the members of the German Socialist Party. The position is especially resented because about one German railway man in six, or a total of some 100,000, has already been called up for military service. The Minister of Railways has had his attention drawn to the matter in the Reichstag, but has declined to interfere or to discuss the subject, excusing himself on the ground of the "political truce."—*Railway Gazette.*